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NEUTRON CROSS SECTIONS FOR CADMIUM ISOTOPES

by

M. K. Drake

prepared for

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Contract SNPC-27

GENERAL ATOMIC

DIVISION OF

GENERAL DYNAMICS

JOHN JAY HOPKINS LABORATORY FOR PURE AND APPLIED SCIENCE

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TOPICAL REPORT

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Technical Management
NASA Lewis Research Center
Cleveland, Ohio
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I. INTRODUCTION

A survey has been made of the available information on neutron cross section measurements of cadmium and its isotopes. Sets of neutron cross sections have been prepared for the element cadmium (Cd-110, Cd-111, Cd-112, Cd-113, Cd-114, and Cd-116). The literature survey for this evaluation is believed to be reasonably complete from information available to November 1965.

II. POSSIBLE NEUTRON REACTIONS

A number of neutron interactions are possible for the isotopes of cadmium. The threshold[1] of these reactions is given in Table 1 for each naturally occurring isotope along with their factional abundance. With the exception of the (n, p) and (n, α) reactions, charged particle reactions were not considered significant for neutronics calculations. The neutron reactions for which cross section sets have been obtained are capture, inelastic scattering, elastic scattering, (n, p), (n, α), and (n, 2n).[1]

III. AVAILABLE EXPERIMENTAL DATA AND BASIS FOR EVALUATED CROSS SECTIONS

3.1 Total Cross Sections

A number of total cross section measurements[2-8] have been made for the element cadmium over the energy range 0.008 eV to 500 eV. This range basically covers the resolved energy range. In the energy range from 500 eV to 100 keV, measurements have been made by Simpson and Fluharty,[9] Jain, et al.,[10] and Seth[11] but only the first of these have been reported in BNL-325.[12, 13] Above 100 keV, measurements have been reported by several groups.[14-22]

The recommended total cross sections have been obtained from a set of resonance parameters for the energy range 0.001 to 500 eV. These resonance parameters, given in Table 2, were obtained from the total cross section measurements mentioned above. Also, results from certain capture cross section measurements[23-25] were used to obtain radiation widths and spin assignments.

Table 1

POSSIBLE NEUTRON REACTIONS WITH CADMIUM

	Cd^{106}	Cd^{108}	Cd^{110}	Cd^{111}	Cd^{112}	Cd^{113}	Cd^{114}	Cd^{116}
Natural Abundance (%)	1.22	0.88	12.39	12.75	24.07	12.26	28.86	7.58
Reaction				Threshold (MeV)				
n, p	0.0	1.00	2.11	0.27	3.28	1.22	3.85	-----
n, np	8.18	8.28	8.99	9.14	9.65	9.76	10.35	10.84
n, d	5.93	6.03	6.74	6.89	7.40	7.51	8.10	8.59
n, nd	15.33	15.50	16.00	13.77	16.26	13.87	16.63	16.52
n, t	9.01	9.18	9.69	7.46	9.95	7.56	10.32	10.21
n, nt	16.81	17.74	16.97	16.73	16.84	16.43	16.70	16.71
n, He^3	4.68	6.18	7.82	8.55	8.48	9.75	19.61	-----
n, nHe^3	14.56	15.67	16.98	14.85	17.92	14.95	18.88	-----
n, He^4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
n, nHe^4	1.49	2.04	2.66	3.25	3.46	3.64	3.32	4.77
n, 2n	12.31	10.52	9.93	7.03	9.37	6.48	9.13	8.71
n, 3n	20.09	18.13	17.26	16.96	16.41	15.85	15.61	14.92
n, γ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
n, n' (first level)	-----	-----	0.656	0.247	0.615	0.265	0.556	0.52

Table 2

RESONANCE PARAMETERS FOR THE CADMIUM ISOTOPES

E_o (eV)	Γ_n (mv)	Γ_{no} (mv)	Γ_γ (mv)	J	g
		Cd^{110}			
89.6	113.6	12.0	130.0	1/2	1
393.0	991.0	50.0	130.0	1/2	1
		Cd^{111}			
27.7	5.11	0.97	115.0	1	3/4
29.1	0.054	0.01	115.0	0, 1	1/2
66.8	1.3	0.16	115.0	0, 1	1/2
86.3	2.97	0.32	115.0	0, 1	1/2
99.6	13.27	1.33	115.0	1	3/4
138.3	8.00	0.68	115.0	1	3/4
164.3	53.5	4.17	115.0	1	3/4
225.4	15.7	1.046	115.0	0, 1	1/2
233.6	118.0	7.72	115.0	0, 1	1/2
276.0	16.9	1.02	115.0	0, 1	1/2
332.6	7.8	0.428	115.0	0, 1	1/2
370.0	45.0	2.34	115.0	0, 1	1/2
415.0	170.0	8.35	115.0	0, 1	1/2
444.0	250.0	11.87	115.0	0, 1	1/2
		Cd^{112}			
67.0	5.73	0.70	100.0	1/2	1.0
83.4	1.67	0.183	100.0	1/2	1.0
226.8	62.3	4.14	100.0	1/2	1.0

Table 2 (Contd)

E_o (eV)	Γ_n (mv)	Γ_{no} (mv)	Γ_γ (mv)	J	g
		Cd^{113}			
0.178	0.6497	1.54	113.0	1	3/4
18.5	0.1862	0.0433	113.0	1	3/4
64.0	2.264	0.283	113.0	1	3/4
84.9	30.13	3.27	113.0	1	3/4
108.5	11.77	1.13	113.0	1	3/4
143.2	6.5	0.543	113.0	0, 1	1/2
159.1	13.87	1.1	113.0	0, 1	1/2
193.2	158.5	11.4	113.0	0	1/4
215.4	19.52	1.33	113.0	1	3/4
261.6	45.0	2.78	113.0	0, 1	1/2
292.4	12.0	0.702	113.0	0, 1	1/2
357.0	50.0	2.65	113.0	0, 1	1/2
389.0	57.0	2.89	113.0	0, 1	1/2
433.0	1.63	0.078	113.0	0, 1	1/2
		Cd^{114}			
58.7	0.077	0.01	100.0	1/2	1
120.2	55.9	5.1	100.0	1/2	1
312.6	18.7	1.06	100.0	1/2	1

Above 500 eV, the recommended total cross sections have been obtained by drawing a smooth curve through the experimentally measured values. In most areas, good agreements were found among measured results. One exception to this was in the region between 0.3 and 2.0 MeV where the values given by Walt, et al., [20] were about 8% higher than those given by the ORNL group. [22] The recommended curve was drawn through the lower values since better agreement could be obtained between the recommended total cross section and the total cross section obtained by summing the recommended partial cross sections. This agreement is shown in Fig. 1 where both the experimental and recommended total cross sections are plotted.

Since no differential total cross sections for the cadmium isotopes have been reported for the energies above 500 eV, the total cross sections were assumed to be the same as for the element. It is expected that in this energy range the total cross sections for the isotopes will not differ significantly from that of the element.

3.2 Capture Cross Sections

The 0.178 eV resonance in Cd-113 completely dominates the thermal capture cross section of cadmium. The 2200 m/sec capture cross sections of Cd-113 calculated from the resonance parameters listed in Table 2 is 20,593. barns. Cd-113 contributes 2,525. to the 2200 m/sec capture cross sections of cadmium. This value is in good agreement with the value of 2537 ± 9 barns measured by Meadows and Whalen[26] and is in fair agreement to the value of 2445 ± 25 barns measured by Sokolowski, et al.[27] Table 3 gives a summary of the measured and recommended values of the 2200 m/sec capture cross sections of the element cadmium and its isotopes.

The recommended capture cross sections have been obtained from the resolved resonance parameters for the energy range from thermal up to 500 eV. Above 500 eV, the capture cross sections for the element have been obtained by drawing a smooth curve through the experimentally measured values.[35-43] The experimental results and the recommended capture cross sections of cadmium are shown in Figs. 2 and 3. Above 0.5 MeV, no experimental results were found and the recommended capture cross sections were assumed to have the characteristic $1/E$ decrease with energy.

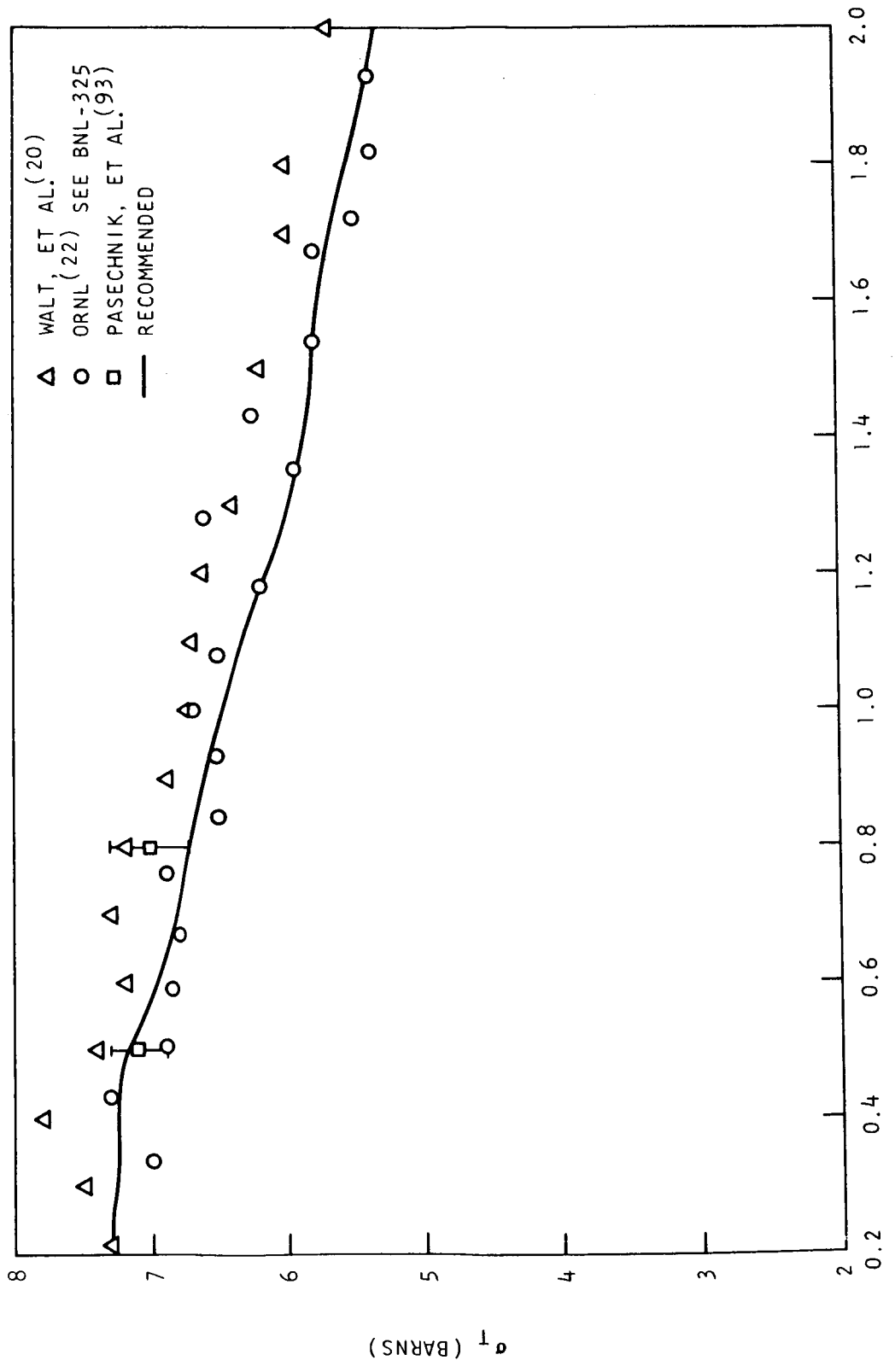

Fig. 1--Cadmium total cross section

Table 3

CAPTURE CROSS SECTIONS OF CADMIUM
(2200 m/sec)

Reaction	Reference	Measured Value (barns)	Recommended Value (barns)
Cd - element	(26)	2537. ± 9	2525.
Cd - element	(27)	2445. ± 25	
Cd^{106} (n, γ) Cd^{107}	(12)	1.0 ± .5	1.0
Cd^{108} (n, γ) Cd^{109} [a]	(28)	1.41 ± .3	10.0
Cd^{108} (n, γ) Cd^{109} [a]	(29)	2.7 ± 0.9	
Cd^{108} (n, γ) Cd^{109} [a]	(30)	24.0 ± 10.	
Cd^{110} (n, γ) Cd^{111m}	(28)	.132 ± .020	0.10
Cd^{110} (n, γ) Cd^{111m}	(27)	.200 ± .10	
Cd^{110} (n, γ) Cd^{111m}	(31)	.082 ± .008	
Cd^{110} (n, γ) Cd^{111} [a]		----	1.0
Cd^{111} (n, γ) Cd^{112} [a]		----	.67 [b]
Cd^{112} (n, γ) Cd^{113m}	(32)	.080 ± .040	.040
Cd^{112} (n, γ) Cd^{113m}	(33)	.043 ± .010	
Cd^{112} (n, γ) Cd^{113} [a]		----	.110
Cd^{113} (n, γ) Cd^{114}		----	20593.
Cd^{114} (n, γ) Cd^{115m}	(34)	.14 ± .03	.14
Cd^{114} (n, γ) Cd^{115} [a]	(34)	1.24 ± .3	1.24
Cd^{116} (n, γ) Cd^{117m}	(28)	.008	0.01
Cd^{116} (n, γ) Cd^{117} [a]	(34)	1.5 ± .3	1.5

[a] Total capture cross section, includes formation of meta-stable state.

[b] Calculated from resolved resonances

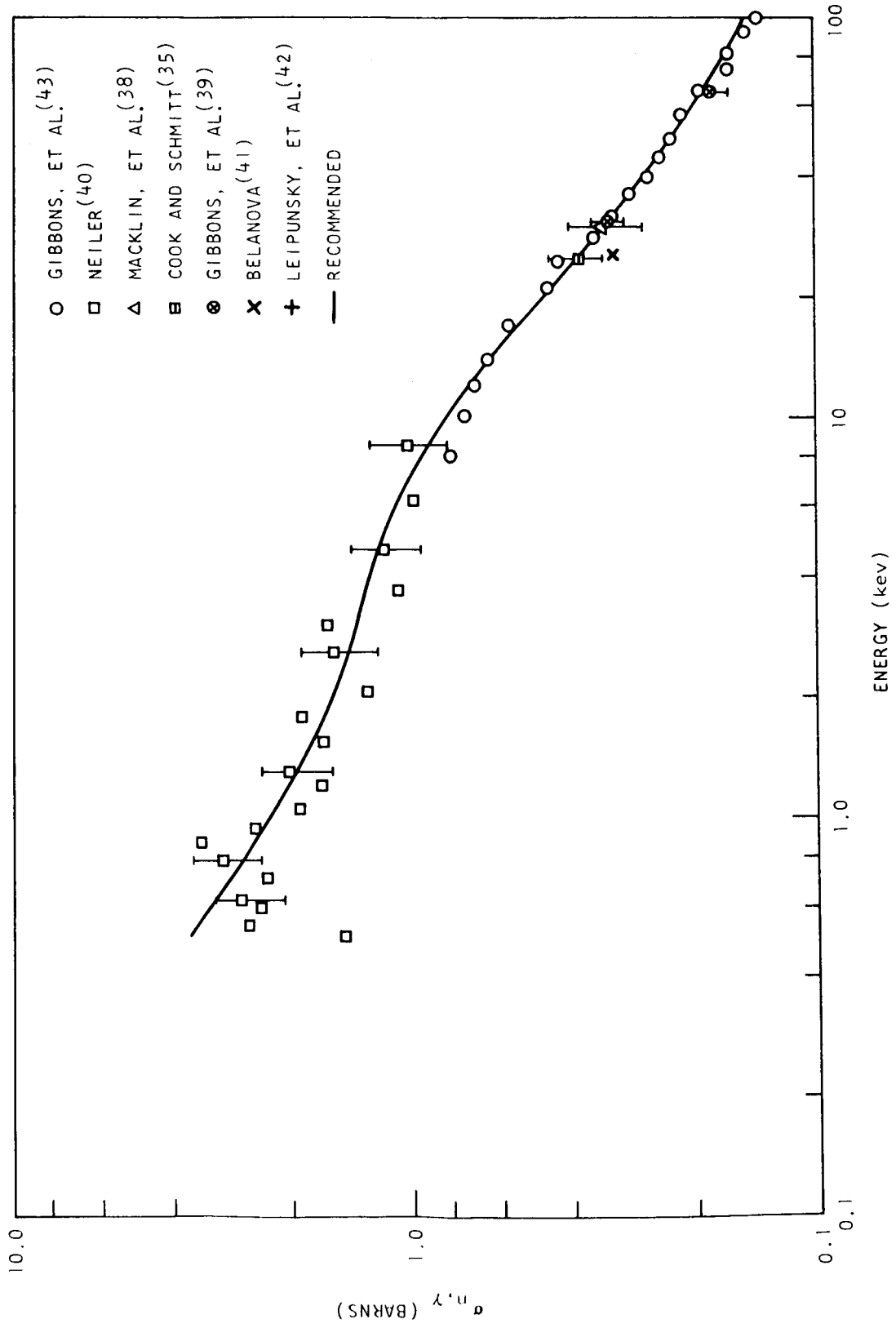

Fig. 2--Cadmium capture cross section

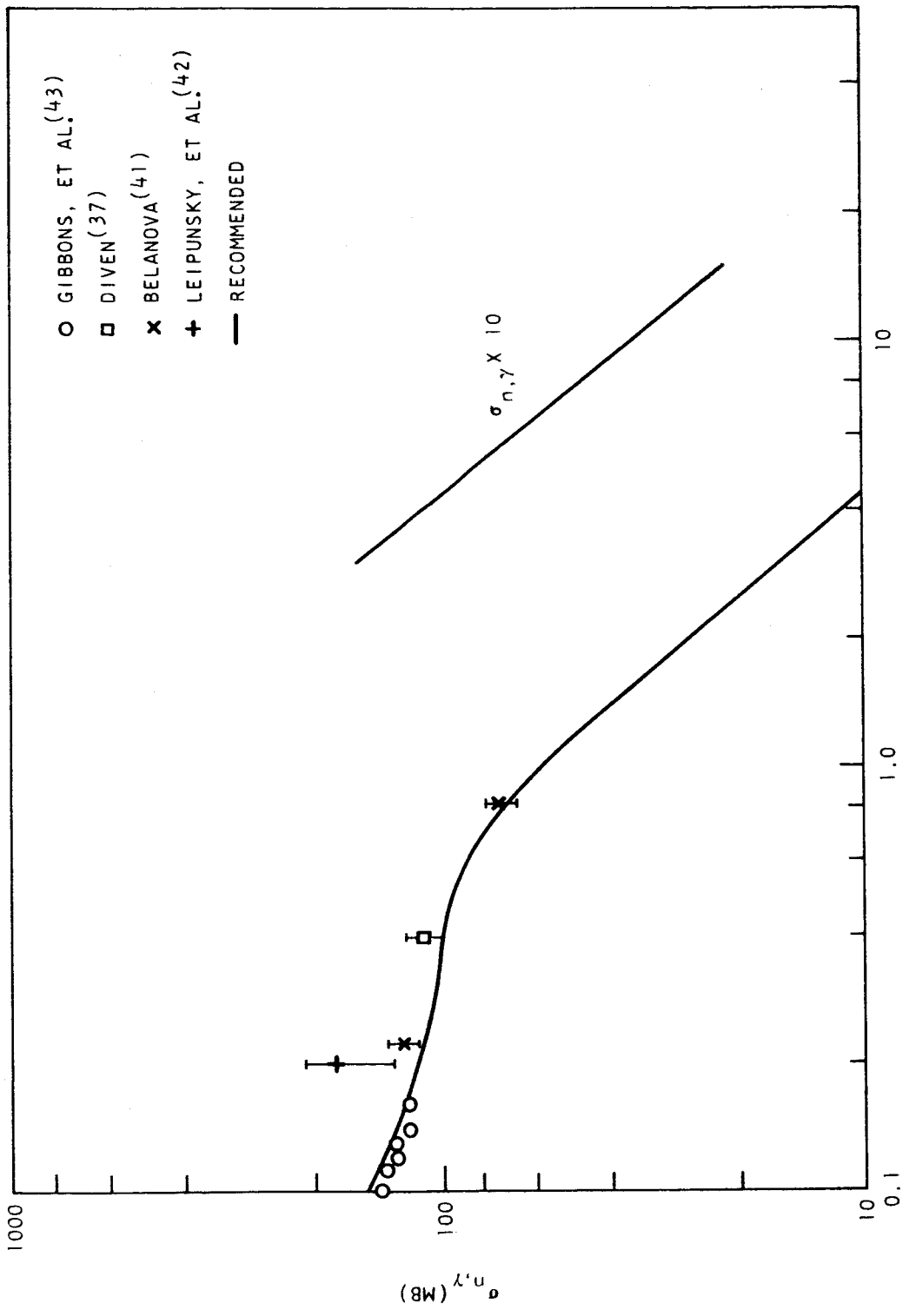

Fig. 3--Cadmium capture cross section

The capture cross sections for the cadmium isotopes have been obtained using a set of unresolved resonance parameters. The average radiation widths used in these calculations were the same as the values selected for the resolved parameters given in Table 2. Jackson and Bollinger[25] have measured the observed level spacing for three of the isotopes. The resulting values were 33 ± 10 eV, 80 ± 30 eV, and 27 ± 7 eV for the isotopes Cd-111, Cd-112, and Cd-113 respectively. A number of measurements have been made from which strength functions were obtained. A summary of the results are given in Table 4. Table 5 gives the recommended unresolved resonance parameters.

3.3 Nonelastic Cross Sections

The nonelastic cross sections have been taken to be the same as the capture cross sections for the energies below 0.2 MeV. Between 0.2 and 1.5 MeV the cross sections were obtained by adding the capture cross section and the total inelastic cross section (see Section 3.7). Several measurements[48-57] have been made of the nonelastic cross sections over the energy range from .4 to 15. MeV. A smooth curve has been drawn through the experimental results to obtain the nonelastic cross sections for the energy range from 1.5 to 15 MeV. Also, for this energy range, the nonelastic cross sections have been assumed to be the same for all of the isotopes of cadmium. Table 6 gives a summary of the available experimentally measured cross sections from which the nonelastic cross sections were obtained.

3.4 (n, 2n) Cross Sections

A few measurements[55, 58-61] have been made of the n, 2n cross sections for cadmium and its isotopes. Most of these measurements have been made at or near 14.5 MeV. Only one measurement, that of Prestwood and Bayhurst[60] for Cd-116, has been made over the total energy range from threshold up to 15 MeV. Pearlstein[62] has made a systematic study of the (n, 2n) cross sections for nuclei of mass greater than 30. He has used the statistical model to estimate the (n, 2n) cross sections near 14 MeV for a number of nuclei including the isotopes of cadmium.

The recommended cross sections have been obtained by using the magnitude of the (n, 2n) cross sections estimated by Pearlstein, and the (n, 2n) thresholds[1] and the general shape of the cross sections as given by the Prestwood and Bayhurst[60] measurements. Table 7 gives a summary of the measured, calculated and recommended (n, 2n) cross sections for incident neutron energies near 14 MeV.

Table 4

EXPERIMENTALLY MEASURED STRENGTH FUNCTIONS

	Reference	Angular Momentum (ℓ)	Strength Function (10^{-4})
Cd - element	(44)	s - wave	0.42 ± 0.16
Cd - element	(45)	s - wave	0.25 ± 0.10
Cd - element	(45)	p - wave	2.00 ± 0.50
Cd - element	(45)	d - wave	< 0.70
Cd - 111	(46)	s - wave	0.44 ± 0.15
Cd - 111	(47)	s - wave	0.38 ± 0.14
Cd - 111	(9)	s - wave	0.33 ± 0.09
Cd - 113	(46)	s - wave	0.14 ± 0.07
Cd - 113	(47)	s - wave	0.38 ± 0.14
Cd - 113	(9)	s - wave	0.43 ± 0.13

Table 5

RECOMMENDED UNRESOLVED RESONANCE PARAMETERS

Isotope	$\langle\Gamma\gamma\rangle$ (mv)	D (eV)	Strength Functions s - wave (10^{-4})	Strength Functions p - wave (10^{-4})
110	130.0	100.0	0.42	2.5
111	115.0	33.0	0.38	2.5
112	100.0	80.0	0.42	2.5
113	113.0	27.0	0.38	2.5
114	100.0	80.0	0.42	2.5
116	100.0	80.0	0.42	2.5

Table 6

NONELASTIC CROSS SECTIONS FOR CADMIUM

Reference	Energy (MeV)	Nonelastic Cross Sections (barns)
(48)	2.5	2.2 ± 0.2
(49)	14.0	1.84 ± 0.06
(50)	14.2	1.91 ± 0.03
(51)	1.0[a]	1.10 ± 0.07
(51)	1.77[a]	1.58 ± 0.10
(51)	2.5[a]	1.94 ± 0.12
(51)	3.25[a]	1.96 ± 0.12
(51)	7.0[a]	2.06 ± 0.10
(52)	6.0[a]	2.11 ± 0.3
(53)	4.0[a]	2.07 ± 0.10
(53)	4.5[a]	2.13 ± 0.12
(54)	14.0	1.89 ± 0.06
(55)	14.0	1.95 ± 0.05
(56)	14.0	2.2 ± 0.6
(57)	14.0	1.92 ± 0.03

[a]Measured inelastic cross section, these values were corrected by adding absorption cross section.

Table 7

SUMMARY OF (n, 2n) CROSS SECTION
NEAR 14 MeV

	Reference	Energy	Cross Section (barns)	Remarks
Cd - element	(55)	14.0	1.42 ± 0.04	Measured
Cd - element	(63)	14.0	1.38 ± 0.3	"
Cd - element	(58)	14.1	1.92 ± 0.14	"
Cd - 106	(59)	14.4	0.827 ± 0.063	"
Cd - 116	(60)	14.5	1.634 ± 0.116	"
Cd - 116	(61)	14.8	1.18 ± 0.16	"
Cd - 106	(62)	14.1	0.71	Calculated
Cd - 110	(62)	14.1	1.390	"
Cd - 111	(62)	14.1	1.63	"
Cd - 112	(62)	14.1	1.55	"
Cd - 113	(62)	14.1	1.73	"
Cd - 114	(62)	14.1	1.65	"
Cd - 116	(62)	14.1	1.74	"
Cd - element	This report	14.5	1.613	Recommended
Cd - 106	"	14.5	0.840	"
Cd - 108	"	14.5	1.132	"
Cd - 110	"	14.5	1.430	"
Cd - 111	"	14.5	1.640	"
Cd - 112	"	14.5	1.583	"
Cd - 113	"	14.5	1.737	"
Cd - 114	"	14.5	1.685	"
Cd - 116	"	14.5	1.664	"

3.5 (n, p) Cross Sections

Only a few measurements have been made of the (n, p) cross sections for the cadmium isotopes. Levkovskii[64-66] has made measurements on several of the isotopes using a 14-15 MeV neutron source. Bayhurst and Prestwood[67] have measured the (n, p) cross section of Cd-111 over the energy range 7.0 to 20.0 MeV. Gardner and Poularikas[68] have made a study of the (n, p) reaction for a number of nuclides and have calculated the (n, p) cross section at 14.5 MeV for several of the cadmium isotopes. The recommended cross sections given in this report are based upon the shape of the cross section measured by Bayhurst and Prestwood.[67] The relative cross sections of the isotopes at 14.5 MeV have been taken from Gardner and Poularikas[68] but these values have been normalized to the value of Cd-111 measured by Bayhurst and Prestwood.[67] A summary of the (n, p) cross sections near 14 MeV are given in Table 8.

3.6 (n,α) Cross Sections

The (n,α) reaction is quite small for cadmium and has a measurable cross section only for incident energies above several MeV. Bayhurst and Prestwood[67] have measured the (n,α) cross section of Cd-112 for the energy range 7.0 to 20 MeV. Measurements[64, 69] for Cd-112 and Cd-114 have been made for neutron energies around 14 MeV. The recommended cross sections of the cadmium isotopes have been estimated from the above measurements. A summary of the measured and calculated values are given in Table 9.

3.7 Inelastic Scattering

Although a number of measurements[51-53, 70-75] have been made of the total inelastic scattering cross section for cadmium, very few attempts[75-79] have been made to measure the cross sections for exciting individual levels. From 0.5 to 8 MeV, the total inelastic cross sections are essentially the same as the nonelastic cross sections. The recommended inelastic cross sections for the natural element have been obtained by drawing a smooth curve through the experimental data for the energy range 0.3 MeV to 8.0 MeV. Also, these cross sections were made consistent by subtracting the other components of the nonelastic cross sections from the recommended nonelastic cross sections. Figures 4 and 5 show the measured and recommended inelastic and nonelastic cross sections of cadmium. Above 8.0 MeV, the total inelastic cross sections have been obtained by subtracting the (n,γ), (n, p), (n,α), and the (n, 2n) cross sections from the recommended nonelastic cross sections. The total inelastic cross sections for the isotopes have been obtained in a similar manner.

Table 8

SUMMARY OF (n, p) CROSS SECTIONS OF CADMIUM

	Reference	Energy (MeV)	Cross Section (mb)	Remarks
Cd - 106	(64)	14-15	76.0 ± 24.0	Measured
Cd - 111	(64)	14-15	15.0 ± 4.0	"
Cd - 112	(64)	14-15	11.0 ± 3.0	"
Cd - 113	(64)	14-15	8.0 ± 2.0	"
Cd - 111	(67)	14.5	28.8 ± 14.0	"
Cd - 106	(68)	14.5	75.0	Calculated
Cd - 108	(68)	14.5	32.0	"
Cd - 110	(68)	14.5	18.0	"
Cd - 111	(68)	14.5	13.0	"
Cd - 112	(68)	14.5	10.0	"
Cd - 113	(68)	14.5	7.0	"
Cd - element	This report	14.5	21.4	Recommended
Cd - 106	"	14.5	161.0	"
Cd - 108	"	14.5	109.0	"
Cd - 110	"	14.5	38.8	"
Cd - 111	"	14.5	28.3	"
Cd - 112	"	14.5	21.6	"
Cd - 113	"	14.5	15.2	"
Cd - 114	"	14.5	10.9	"
Cd - 116	"	14.5	4.3	"

Table 9

SUMMARY OF (n,α) CROSS SECTIONS OF CADMIUM NEAR 14 MeV

	Reference	Energy (MeV)	Cross Section (mb)	Remarks
Cd - 112	(67)	14.5	3.1 ± 0.25	Measured
Cd - 112	(64)	14-15	1.3 ± 0.3	"
Cd - 114	(64)	14-15	0.6 ± 0.1	"
Cd - 114	(69)	14.0	0.64 ± 0.2	"
Cd - element	This report	14.5	3.07	Recommended
Cd - 106	"	14.5	20.3	"
Cd - 108	"	14.5	10.9	"
Cd - 110	"	14.5	5.7	"
Cd - 111	"	14.5	4.1	"
Cd - 112	"	14.5	3.0	"
Cd - 113	"	14.5	2.1	"
Cd - 114	"	14.5	1.5	"
Cd - 116	"	14.5	1.1	"

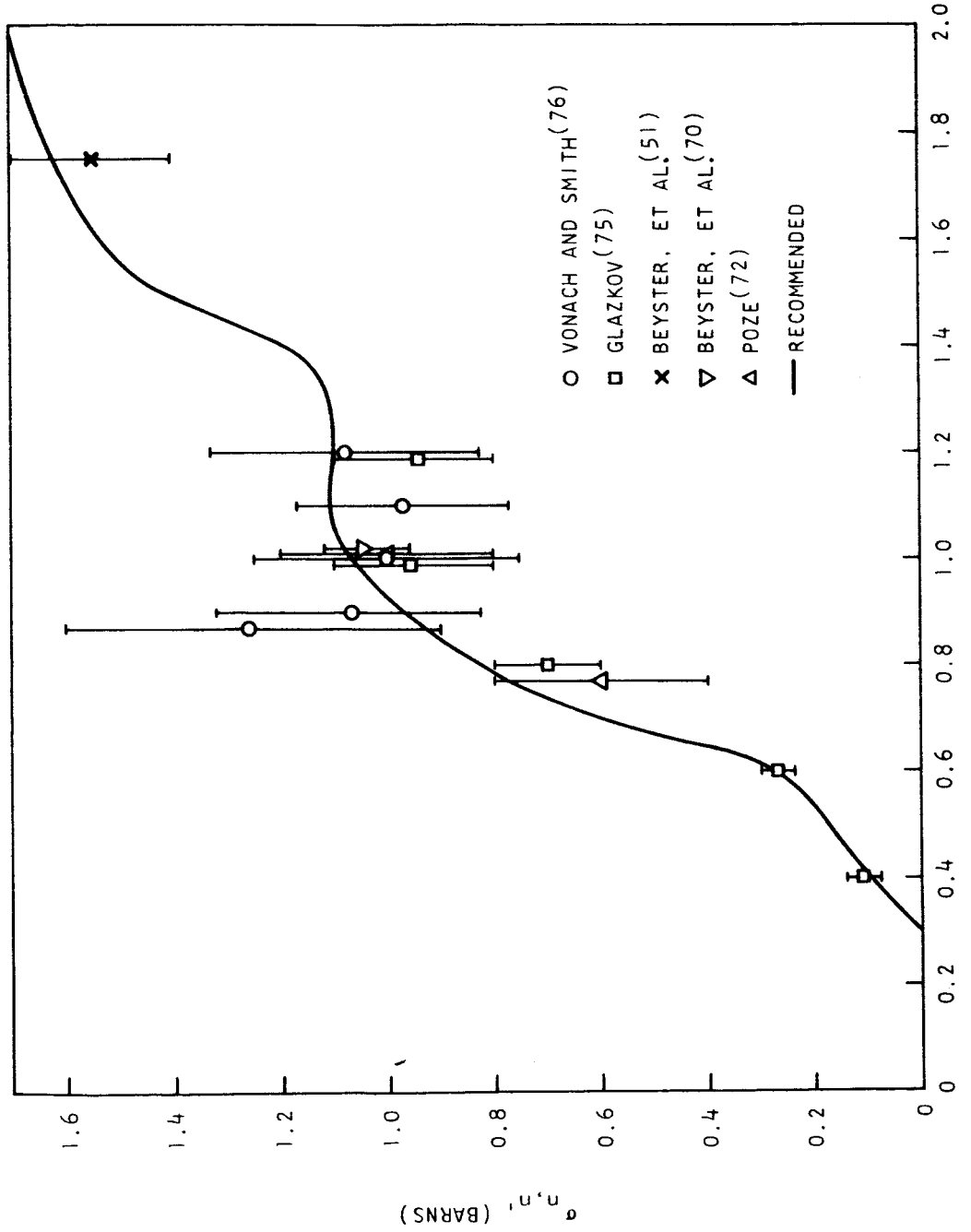

Fig. 4--Cadmium inelastic cross section

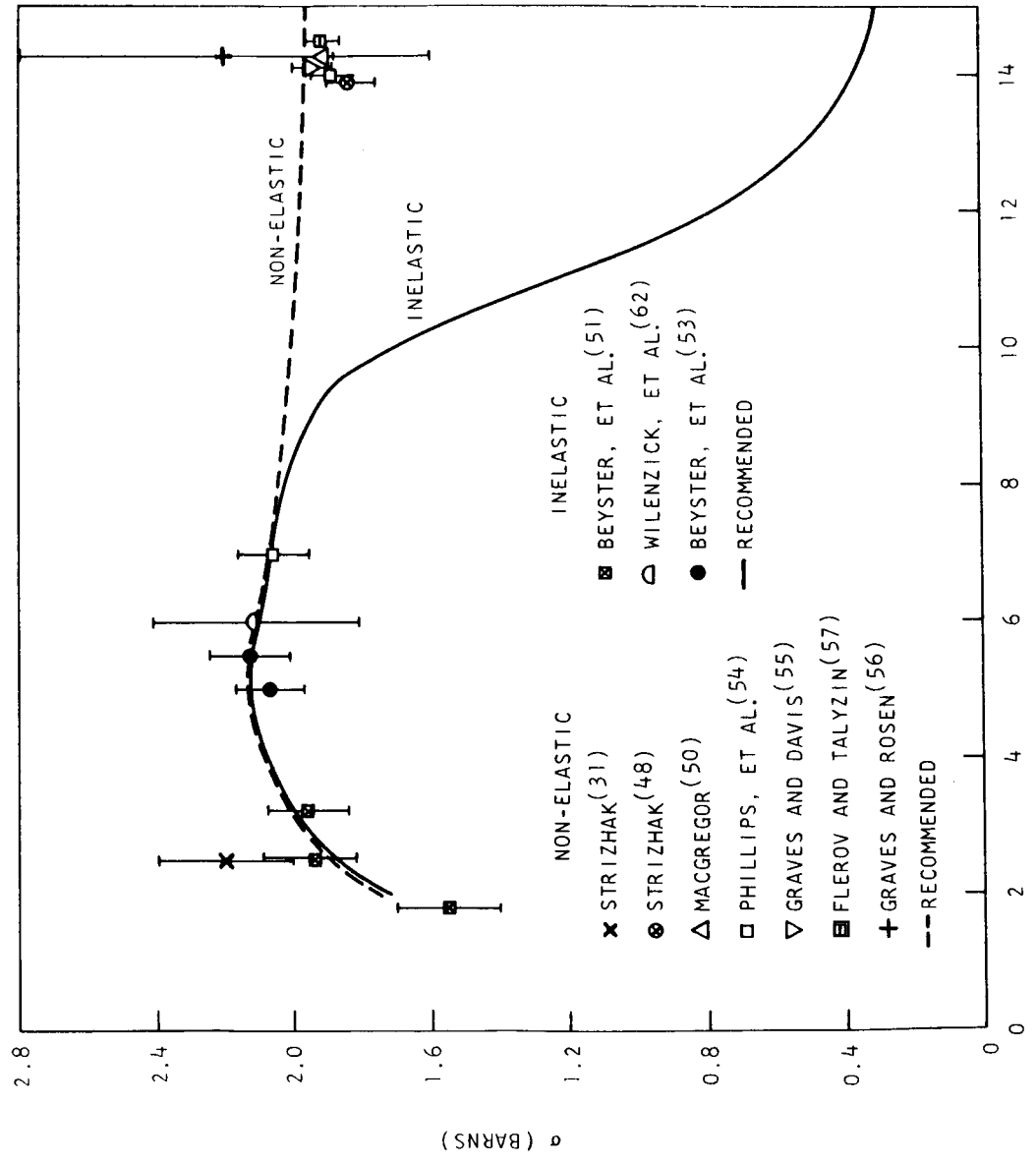

Fig. 5--Cadmium inelastic and nonelastic cross sections

An attempt was made to obtain the differential cross sections for exciting individual levels in cadmium and its isotopes. The level schemes[80] for the major isotopes are given in Fig. 6. These levels have been divided into four average levels: 0.24 - 0.40 MeV, 0.5 - 0.7 MeV, 1.1 - 1.3 MeV, and 1.3 - 1.4 MeV. The odd isotopes, Cd-111 and Cd-113, have the 0.24 - 0.4 MeV level while the even isotopes have the 1.3 - 1.4 MeV level.

The available data from the differential measurement along with the level schemes were used to obtain the level excitation cross section from 0.3 MeV to 1.5 MeV. For lack of better information, the 0.24 - 0.4 MeV and the 1.1 - 1.2 MeV levels have been taken to have the same value for both odd isotopes, and the 1.3 - 1.4 MeV level has been taken to be the same for the even isotope. The 0.4 - 0.7 MeV level has been taken to be the same for all isotopes. The experimentally measured and recommended values for the excitation cross sections of the 0.24 - 0.4 MeV and the 0.5 - 0.7 MeV levels for the element cadmium are shown in Figs. 7 and 8.

3.8 Elastic Scattering

The elastic scattering cross sections for cadmium and its isotopes were obtained from the resonance parameters given in Table 2 for the energy range 0.001 to 500 eV. From 500 eV to 15 MeV, the elastic scattering cross sections have been obtained by subtracting the nonelastic cross sections from the total cross sections. The resulting cross sections have been checked and found to be in good agreement with the measured[52, 71] elastic scattering cross sections. Figures 9 and 10 show the recommended elastic scattering cross sections and the measured values. The experimental values at 0.98 MeV,[82] 1.0 MeV,[84] 3.7 MeV,[85] 4.1 MeV,[71] and 14.6 MeV[86] were obtained[87] by integrating the angular distributions.

3.9 Angular Distribution

Measurements[71, 82-93] have been made of the angular distribution of elastically scattered neutron for the energy range from 0.3 to 14.6 MeV. These distributions have been compiled in BNL-400[87] and Howerton.[94] Legendre coefficients for the angular distribution in the center of mass system have been obtained from a least squares analysis of each set of data. The coefficients were defined so that

$$\sigma(E,\mu) = \sum_{\ell=0}^{\ell=12} \frac{2\ell+1}{2} f_\ell(E) P_\ell(\mu)$$

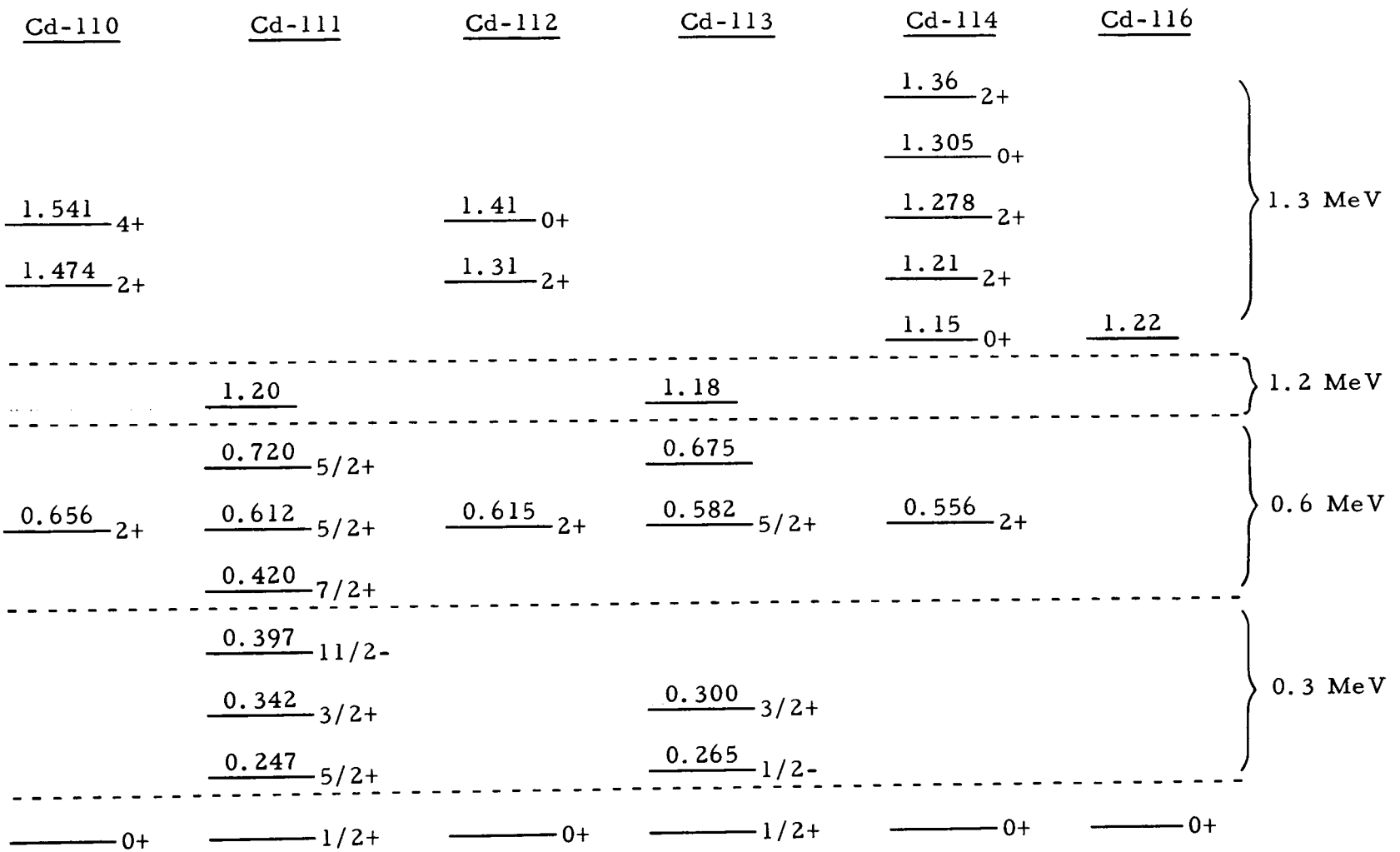

Fig. 6--Level scheme of the cadmium isotopes

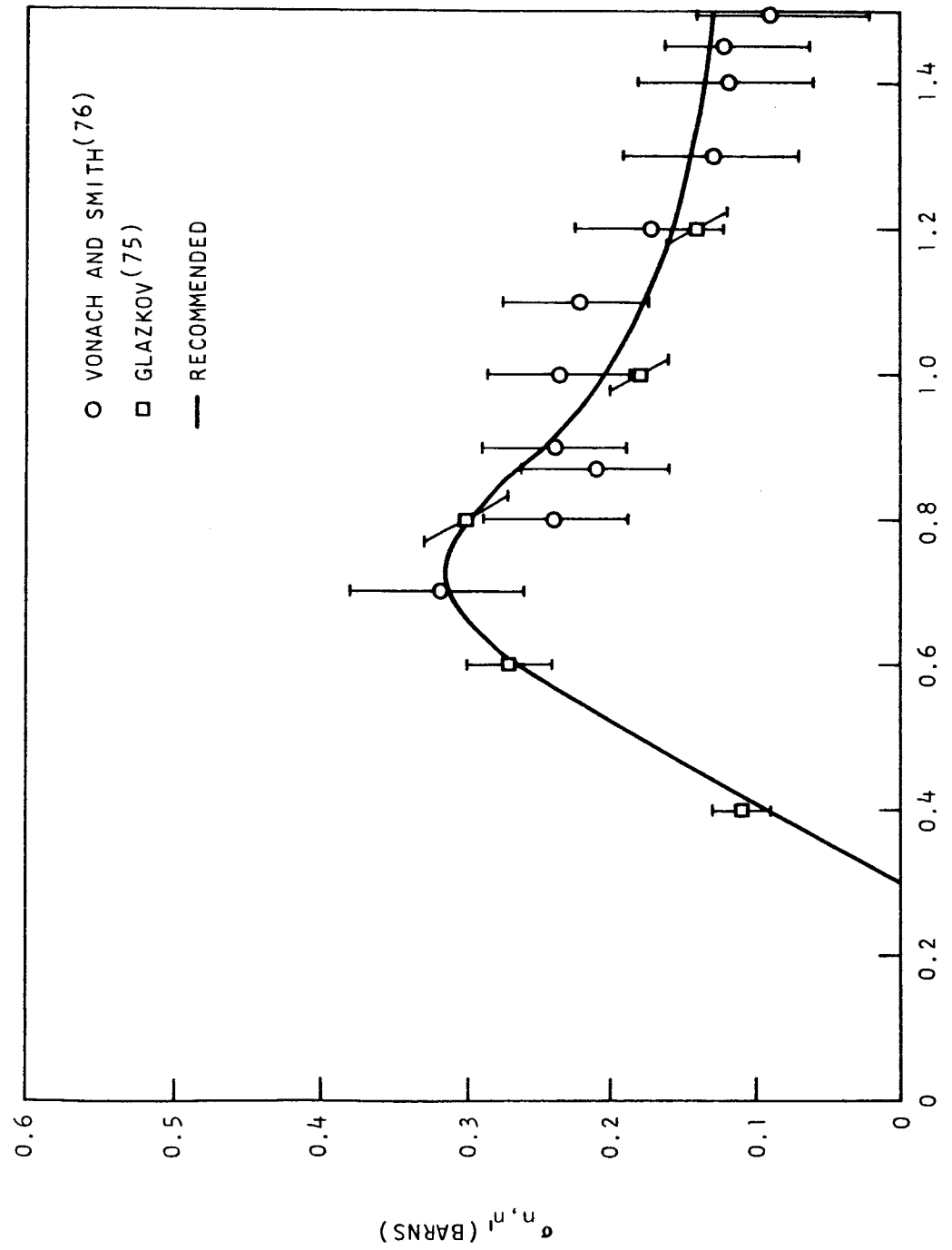

Fig. 7--Cadmium inelastic cross section for the 0.3 MeV level

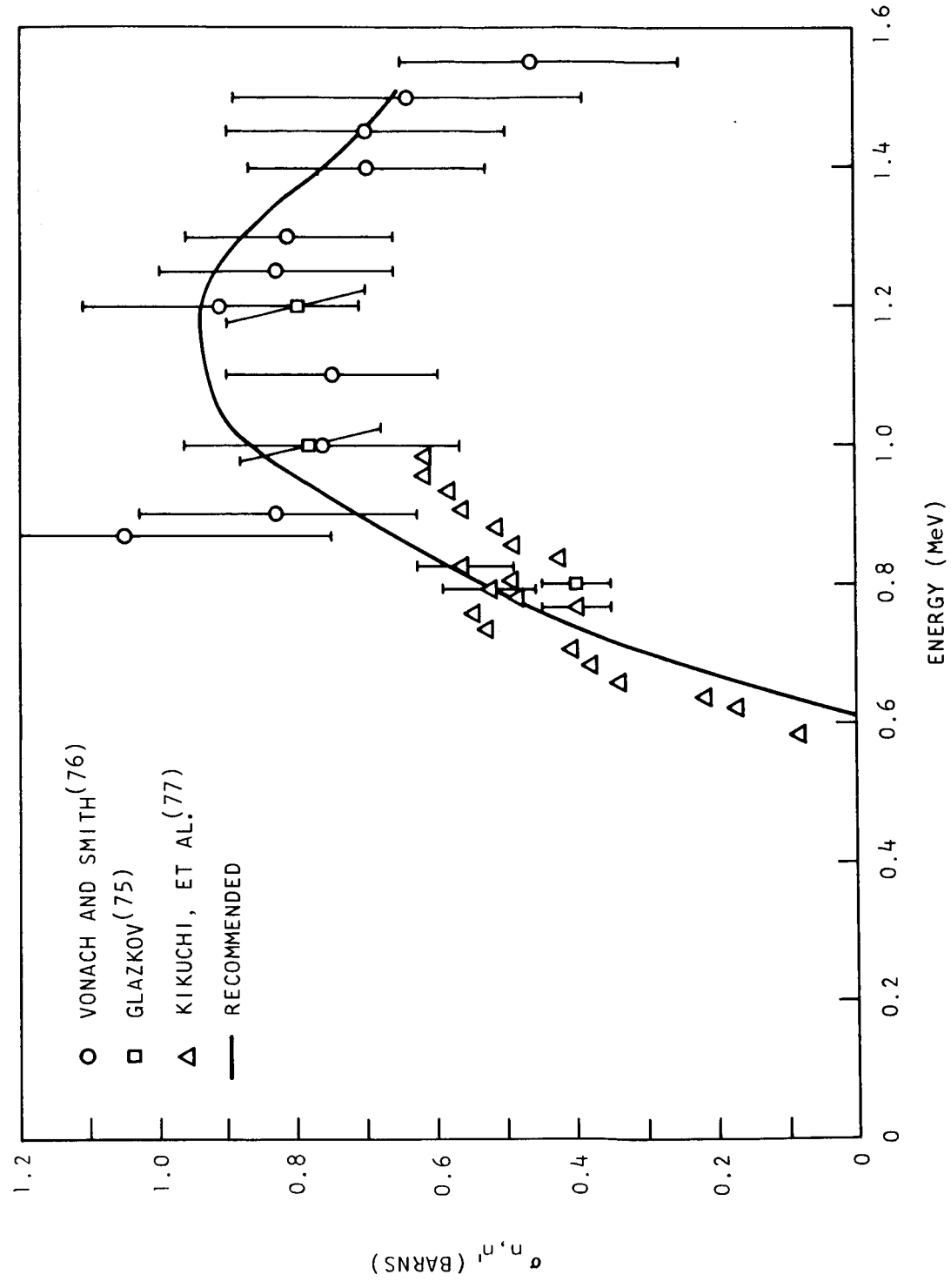

Fig. 8--Cadmium inelastic cross section for the 0.6 MeV level

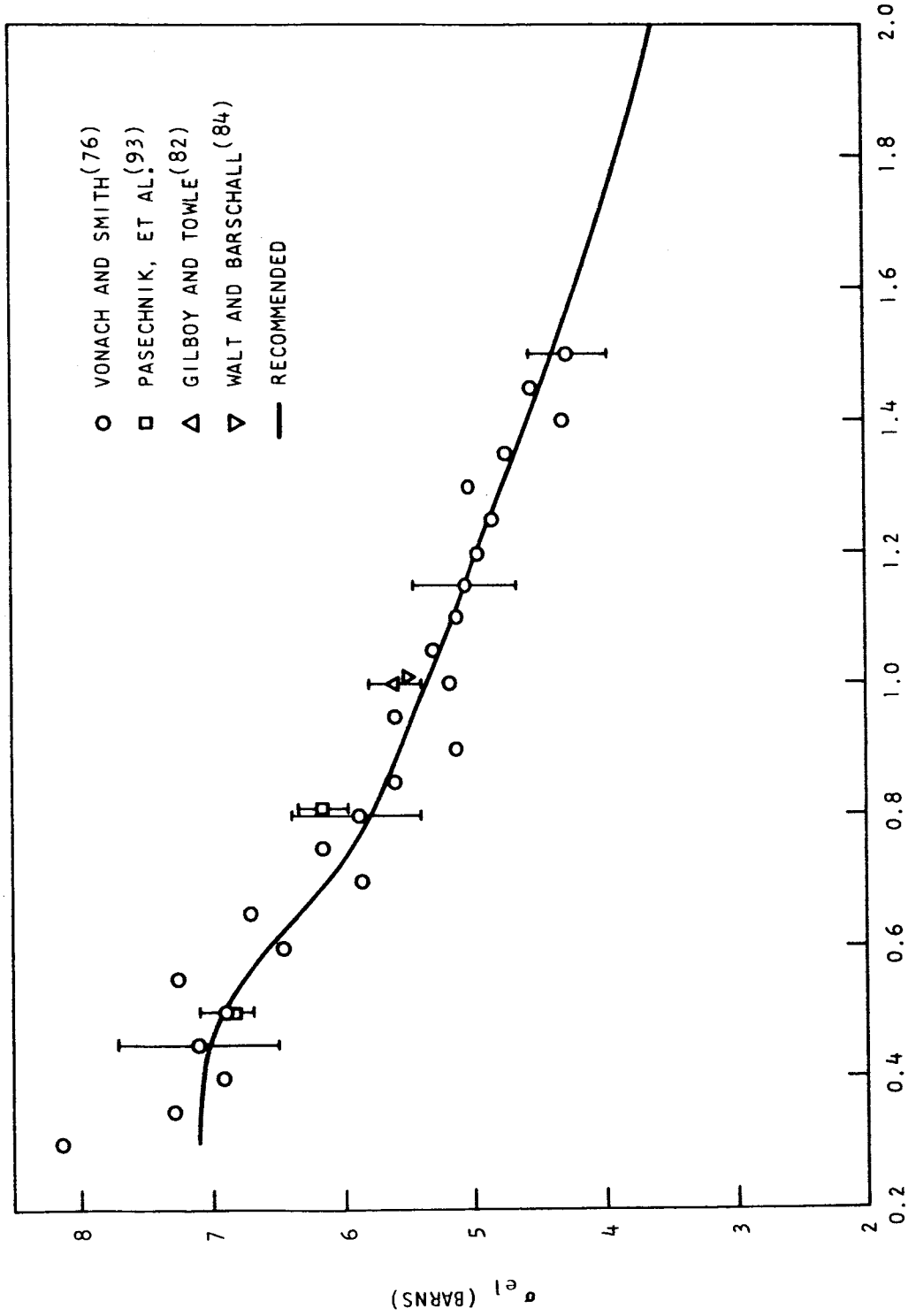

Fig. 9--Cadmium elastic cross section

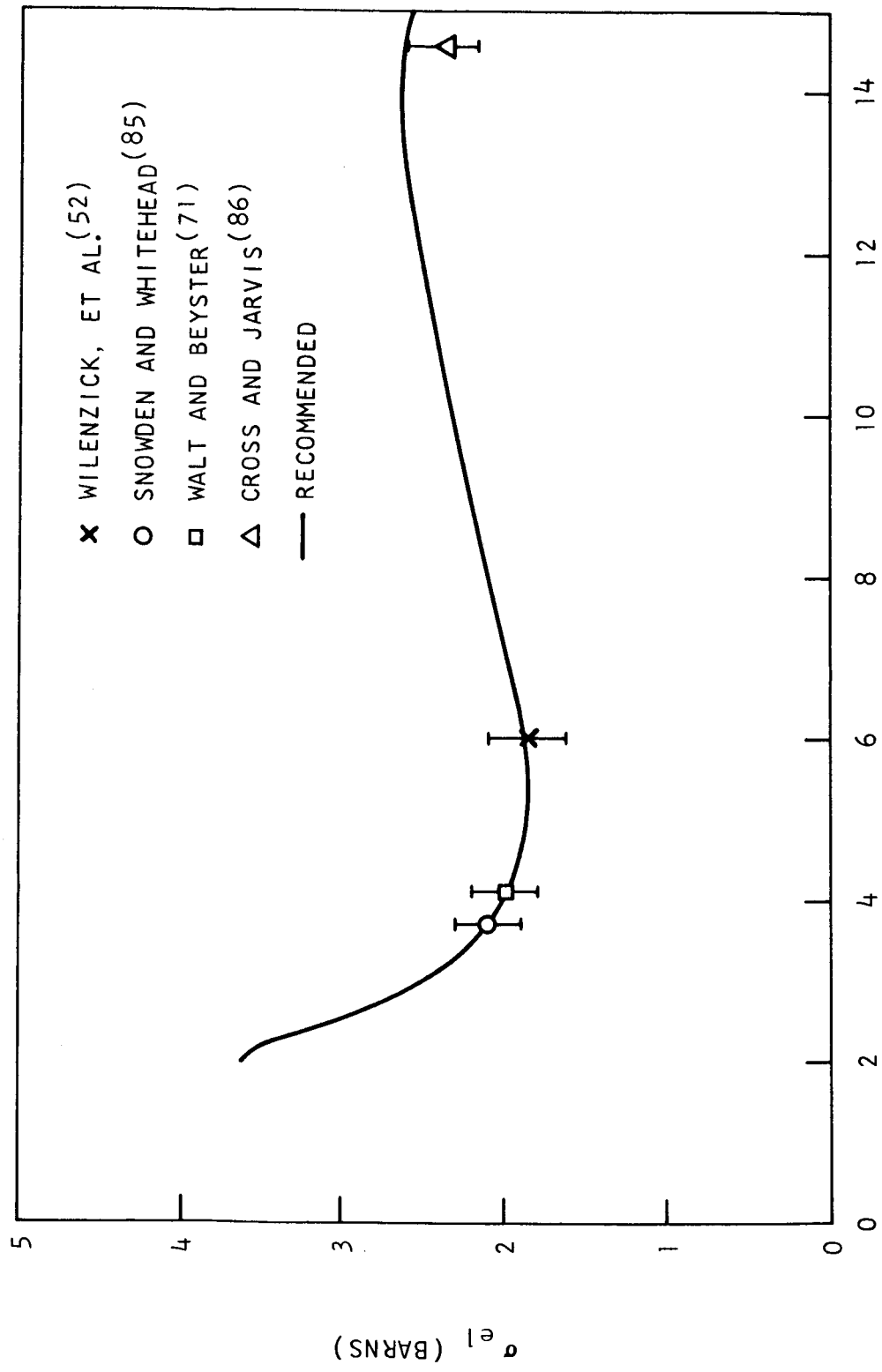

Fig. 10--Cadmium elastic cross section

These were assumed to be the same for all the cadmium isotopes. Figures 11 through 14 give the angular distribution calculated from the Legendre coefficient for several incident neutron energies.

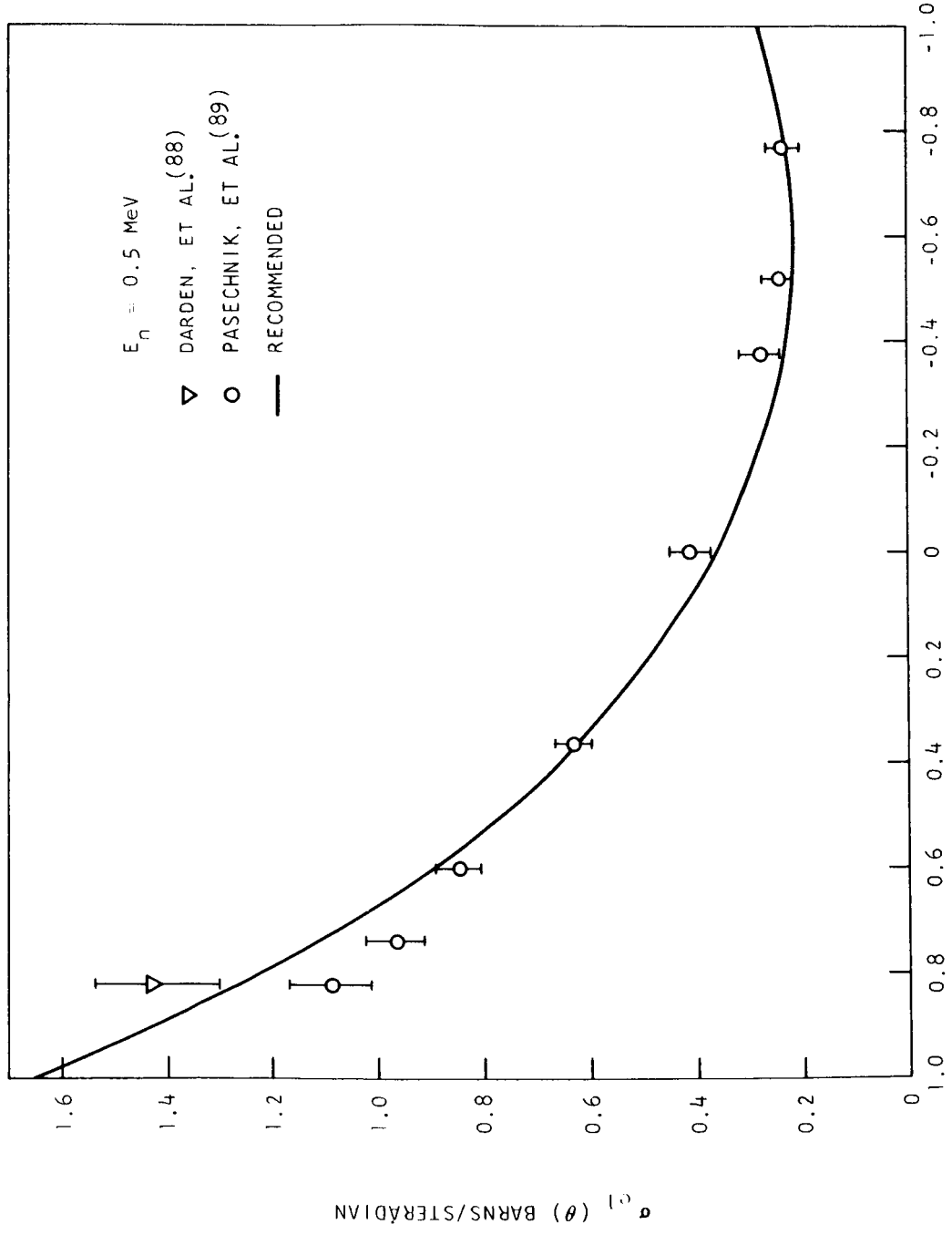

Fig. 11--Cadmium differential elastic cross section

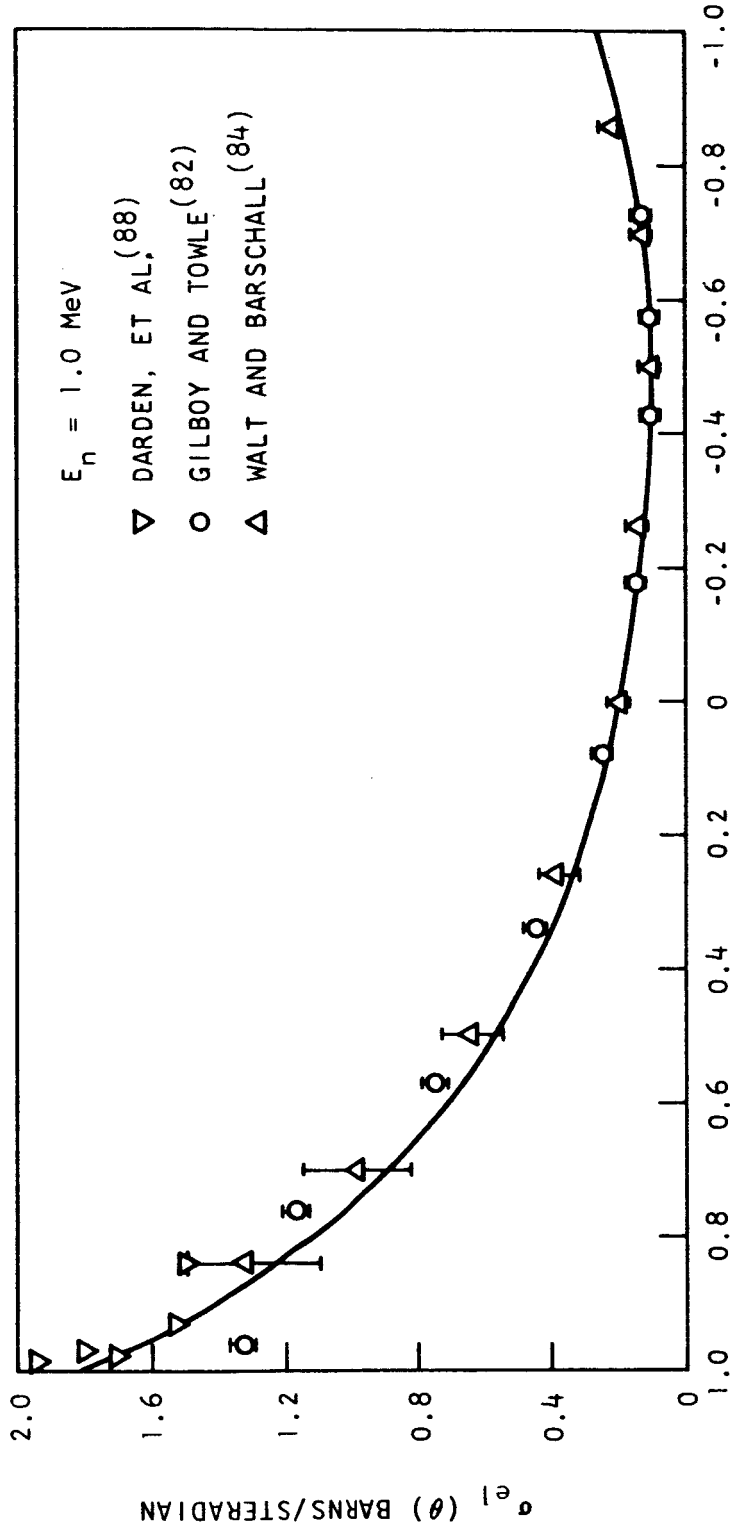

Fig. 12--Cadmium differential elastic cross section

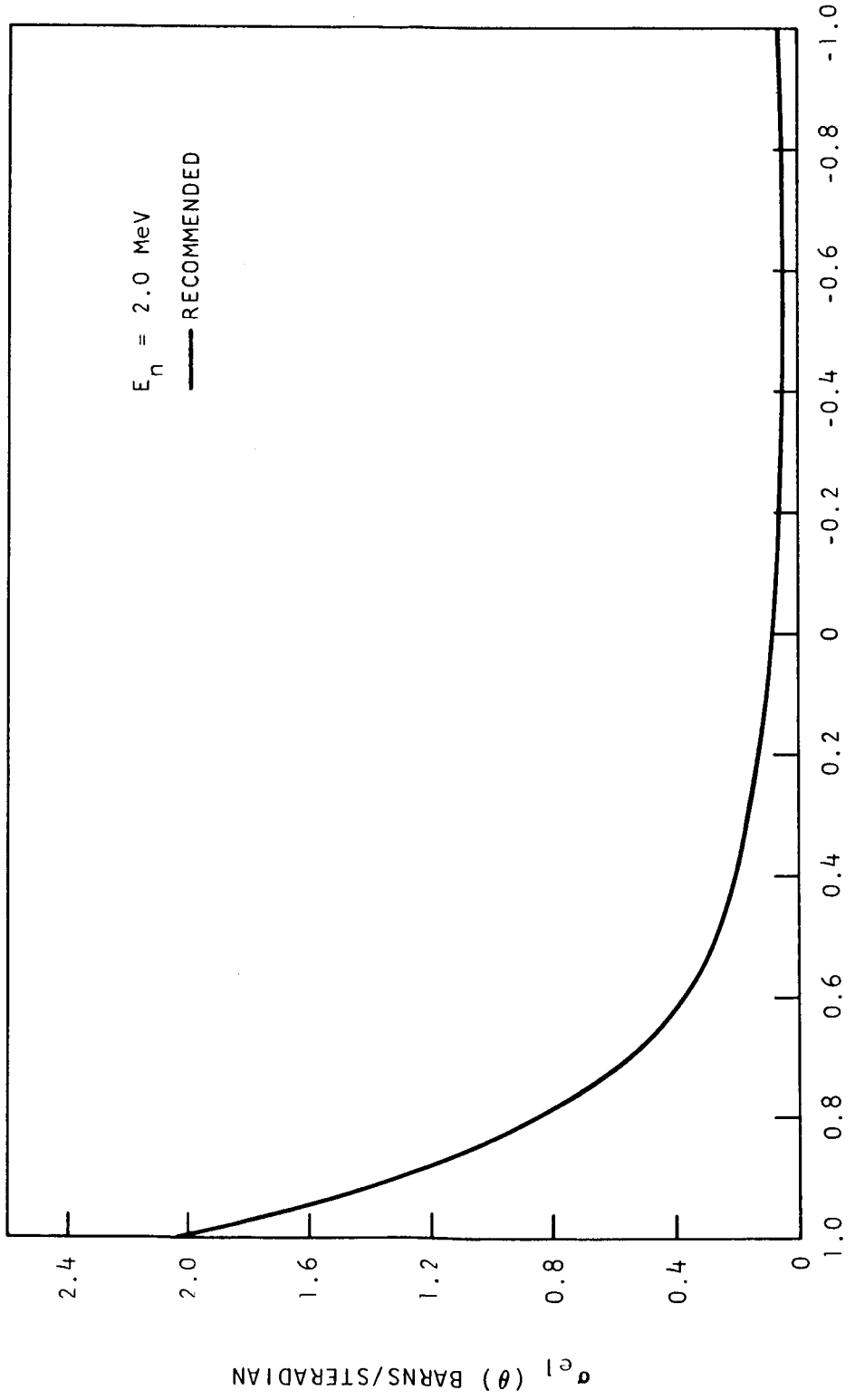

Fig. 13--Cadmium differential cross section

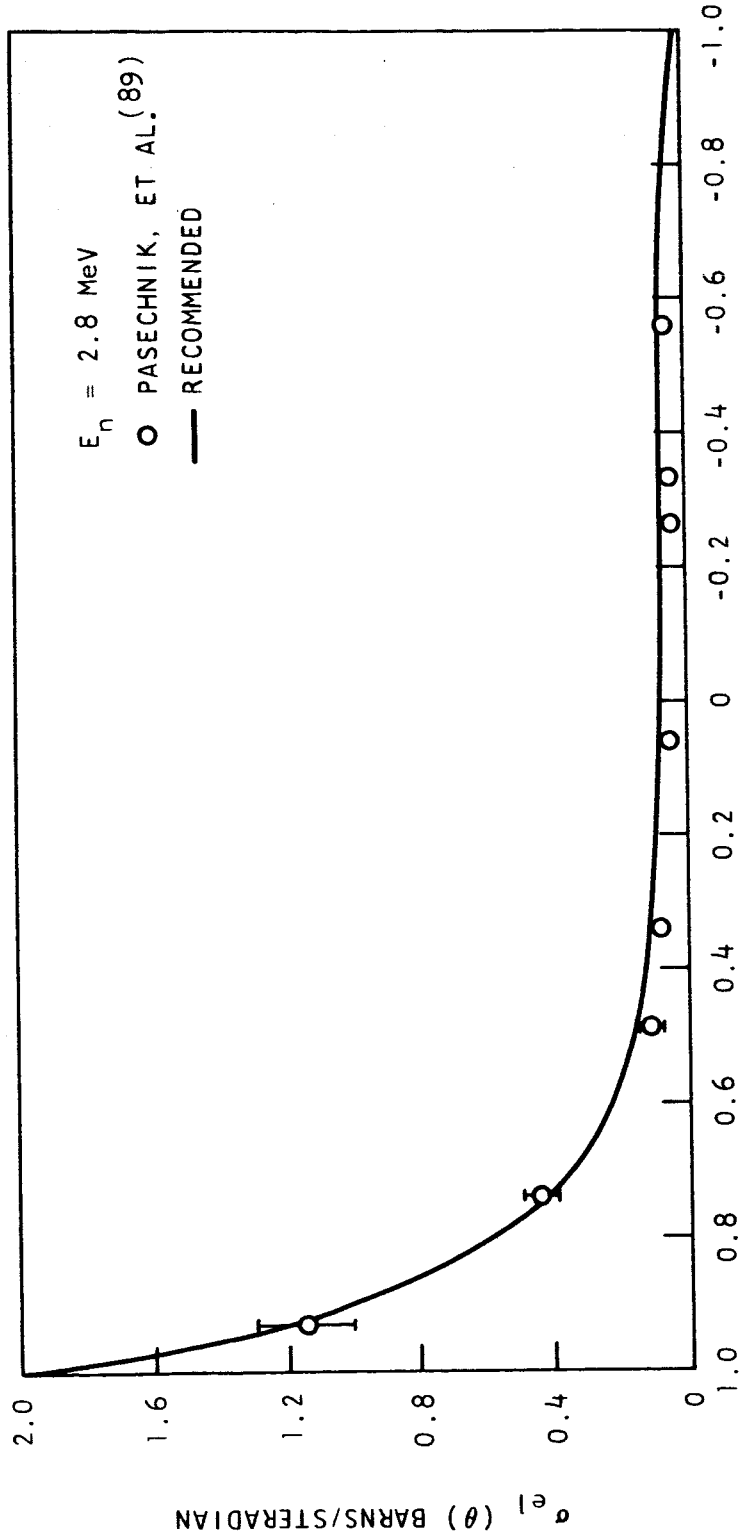

Fig. 14--Cadmium differential elastic cross section

IV. CROSS SECTION TABULATIONS

The recommended cross sections for cadmium and its isotopes are given in Tables 10 through 16 for the energy range 500 eV to 15 MeV. The low energy cross sections (0.001 to 2.38 eV) for natural cadmium and Cd-113 are given in Tables 17 and 18. The differential inelastic cross sections for exciting individual levels are given in Tables 19 through 21. The Legendre expansion coefficients are given in Table 22.

Table 10

CROSS SECTIONS FOR NATURAL CADMIUM*

E (MeV)	Total	Non-Elastic	Elastic	In-Elastic	Absorption	n, γ	n, p	n, α	n, 2n
15.0	4.55	1.960	2.59	0.297	0.0305	0.0021	0.0248	0.0036	1.633
14.5	4.60	1.965	2.635	0.325	0.0267	0.0022	0.0214	0.0031	1.613
14.0	4.62	1.970	2.65	0.366	0.0235	0.0023	0.0186	0.0026	1.581
13.5	4.60	1.975	2.625	0.423	0.0205	0.0024	0.0159	0.0022	1.532
13.0	4.58	1.980	2.6	0.515	0.0178	0.0025	0.0135	0.0018	1.447
12.5	4.56	1.985	2.575	0.634	0.0155	0.0027	0.0113	0.0015	1.336
12.0	4.54	1.990	2.55	0.795	0.0135	0.0028	0.0095	0.0012	1.182
11.5	4.52	1.995	2.525	0.996	0.0118	0.0030	0.0079	0.0009	0.987
11.0	4.47	2.000	2.47	1.239	0.0104	0.0032	0.0065	0.0007	0.751
10.5	4.41	2.005	2.405	1.484	0.0092	0.0034	0.0053	0.0005	0.512
10.0	4.36	2.010	2.35	1.717	0.0084	0.0036	0.0044	0.0004	0.285
9.5	4.32	2.02	2.30	1.879	0.0077	0.0039	0.0035	0.0003	0.133
9.0	4.27	2.03	2.24	1.953	0.0072	0.0042	0.0028	0.0002	0.070
8.5	4.22	2.04	2.18	1.998	0.0068	0.0045	0.0021	0.0002	0.035
8.0	4.18	2.05	2.13	2.034	0.0067	0.0049	0.0017	0.0001	0.009
7.5	4.11	2.06	2.05	2.053	0.0067	0.0053	0.0013	0.0001	0.0
7.0	4.08	2.08	2.02	2.073	0.0068	0.0057	0.0010	0.0001	
6.5	4.03	2.09	1.94	2.083	0.0070	0.0063	0.0007	0.0	
6.0	4.01	2.109	1.901	2.102	0.0073	0.0068	0.0005		
5.5	4.00	2.130	1.870	2.122	0.0078	0.0075	0.0003		
5.0	4.00	2.130	1.870	2.121	0.0086	0.0084	0.0002		
4.5	4.02	2.120	1.900	2.110	0.0096	0.0095	0.0001		
4.0	4.08	2.081	1.999	2.070	0.0111	0.0110	0.0001		
3.5	4.22	2.043	2.177	2.030	0.0130	0.0130	0.0		
3.0	4.48	1.976	2.504	1.961	0.0155	0.0155			
2.8	4.63	1.957	2.673	1.940	0.0170	0.0170			
2.6	4.77	1.909	2.861	1.890	0.0190	0.0190			
2.4	5.00	1.861	3.139	1.840	0.0205	0.0205			
2.2	5.30	1.803	3.497	1.780	0.0230	0.0230			
2.0	5.35	1.746	3.604	1.720	0.0260	0.0260			
1.8	5.55	1.660	3.890	1.630	0.0295	0.0295			
1.6	5.78	1.564	4.216	1.530	0.0340	0.0340			
1.4	5.80	1.230	4.566	1.194	0.0400	0.0400			
1.2	6.09	1.146	4.944	1.098	0.0480	0.0480			
1.0	6.50	1.128	5.372	1.070	0.0575	0.0575			
0.95	6.55	1.081	5.469	1.020	0.0610	0.0610			
0.90	6.60	1.024	5.576	0.960	0.0640	0.0640			
0.85	6.65	0.969	5.681	0.900	=n, γ	0.069			
0.80	6.70	0.903	5.797	0.830		0.073			
0.75	6.75	0.816	5.934	0.740		0.076			

*Cross sections are given in barns

Table 10 (Contd)

E (MeV)	Total	Non-Elastic	Elastic	In-Elastic	Absorption	n, γ	n, p	n, α	n, 2n
0.70	6.80	0.680	6.120	0.600	=n, γ	0.080	0.0	0.0	0.0
0.65	6.85	0.509	6.341	0.425		0.084			
0.60	6.95	0.352	6.598	0.264		0.088			
0.55	7.05	0.311	6.739	0.220		0.091			
0.50	7.20	0.270	6.930	0.175		0.095			
0.45	7.25	0.230	7.020	0.132		0.098			
0.40	7.25	0.199	7.051	0.099		0.100			
0.35	7.25	0.149	7.101	0.047		0.102			
0.30	7.25	0.105	7.145	0.0		0.105			
0.28	7.26	0.106	7.154			0.106			
0.26	7.27	0.107	7.163			0.107			
0.24	7.28	0.108	7.172			0.108			
0.22	7.27	0.112	7.158			0.112			
0.20	7.26	0.115	7.145			0.115			
0.18	7.25	0.118	7.132			0.118			
0.16	7.24	0.124	7.116			0.124			
0.14	7.23	0.130	7.100			0.130			
0.12	7.22	0.138	7.082			0.138			
0.10	7.20	0.150	7.050			0.150			
0.09	7.15	0.160	6.990			0.160			
0.08	7.10	0.170	6.930			0.170			
0.07	7.05	0.180	6.870			0.180			
0.06	7.00	0.200	6.800			0.200			
0.05	6.95	0.225	6.725			0.225			
0.04	6.90	0.260	6.64			0.26			
0.03	6.85	0.330	6.52			0.33			
0.025	6.80	0.380	6.42			0.38			
0.02	6.75	0.470	6.28			0.47			
0.015	6.75	0.620	6.13			0.62			
0.01	6.70	0.85	5.85			0.85			
0.009	6.70	0.90	5.80			0.90			
0.008	6.65	0.97	5.68			0.97			
0.007	6.60	1.03	5.57			1.03			
0.006	6.55	1.10	5.45			1.10			
0.005	6.50	1.20	5.30			1.20			
0.004	6.45	1.30	5.15			1.30			
0.003	6.40	1.40	5.00			1.40			
0.002	6.35	1.60	4.75			1.60			
0.001	6.25	2.25	4.00			2.25			
0.0009	6.20	2.40	3.80			2.40			
0.0008	6.45	2.60	3.85			2.60			
0.0007	7.00	2.90	4.10			2.90			
0.0006	8.00	3.20	4.80			3.20			
0.0005	9.90	3.60	6.30			3.60			

Table 11

CROSS SECTIONS FOR Cd^{110}*

E (MeV)	Total	Non-Elastic	Elastic	In-Elastic	Absorption	n, γ	n, p	n, α	n, 2n
15.0	4.55	1.960	2.590	0.437	0.0509	0.0020	0.0425	0.0064	1.472
14.5	4.60	1.965	2.635	0.488	0.0466	0.0021	0.0388	0.0057	1.430
14.0	4.62	1.970	2.650	0.548	0.0424	0.0022	0.0351	0.0051	1.380
13.5	4.60	1.975	2.625	0.632	0.0384	0.0023	0.0316	0.0045	1.305
13.0	4.58	1.980	2.600	0.745	0.0346	0.0024	0.0283	0.0039	1.200
12.5	4.56	1.985	2.575	0.909	0.0311	0.0026	0.0251	0.0034	1.045
12.0	4.54	1.990	2.550	1.127	0.0276	0.0027	0.0220	0.0029	0.835
11.5	4.52	1.995	2.525	1.421	0.0245	0.0029	0.0192	0.0024	0.550
11.0	4.47	2.000	2.470	1.759	0.0214	0.0030	0.0165	0.0019	0.220
10.5	4.41	2.005	2.405	1.950	0.0188	0.0032	0.0141	0.0015	0.136
10.0	4.36	2.010	2.350	1.994	0.0165	0.0034	0.0119	0.0012	0.0
9.5	4.32	2.020	2.300	2.006	0.0145	0.0037	0.0100	0.0008	
9.0	4.27	2.030	2.240	2.017	0.0129	0.0040	0.0083	0.0006	
8.5	4.22	2.040	2.180	2.028	0.0116	0.0043	0.0068	0.0005	
8.0	4.18	2.050	2.130	2.040	0.0105	0.0047	0.0055	0.0003	
7.5	4.11	2.060	2.050	2.050	0.0097	0.0051	0.0044	0.0002	
7.0	4.08	2.080	2.020	2.071	0.0089	0.0054	0.0034	0.0001	
6.5	4.03	2.090	1.940	2.081	0.0087	0.0060	0.0026	0.0001	
6.0	4.01	2.109	1.901	2.101	0.0084	0.0065	0.0019	0.0	
5.5	4.00	2.130	1.870	2.122	0.0084	0.0071	0.0013		
5.0	4.00	2.130	1.870	2.121	0.0088	0.0080	0.0008		
4.5	4.02	2.120	1.900	2.111	0.0093	0.0090	0.0003		
4.0	4.08	2.081	1.999	2.076	0.0105	0.0105	0.0		
3.5	4.22	2.043	2.177	2.031	0.0124	0.0124			
3.0	4.48	1.976	2.504	1.961	0.0147	0.0147			
2.8	4.63	1.957	2.673	1.941	0.0162	0.0162			
2.6	4.77	1.909	2.861	1.891	0.0181	0.0181			
2.4	5.00	1.861	3.139	1.842	0.0195	0.0195			
2.2	5.30	1.803	3.497	1.781	0.0219	0.0219			
2.0	5.35	1.746	3.604	1.722	0.0241	0.0241			
1.8	5.55	1.660	3.890	1.632	0.0280	0.0280			
1.6	5.78	1.564	4.216	1.532	0.0323	0.0323			
1.4	6.02	1.139	4.881	1.101	0.0380	0.0380			
1.2	6.25	0.986	5.264	0.94	0.0456	0.0456			
1.0	6.50	0.925	5.575	0.870	0.0546	0.0546			
0.95	6.55	0.854	5.696	0.796	0.0580	0.0580			
0.90	6.60	0.775	5.825	0.714	0.0608	0.0608			
0.85	6.65	0.693	5.957	0.627	=n, γ	0.066			
0.80	6.70	0.602	6.098	0.533		0.069			
0.75	6.75	0.500	6.250	0.428		0.072			

*Cross sections are given in barns

Table 11 (Contd)

E (MeV)	Total	Non-Elastic	Elastic	In-Elastic	Absorption	n, γ	n, p	n, α	n, 2n
0.70	6.80	0.366	6.434	0.290	=n, γ	0.076	0.0	0.0	0.0
0.65	6.85	0.209	6.641	0.129		0.080			
0.60	6.95	0.084	6.866	0.0		0.084			
0.55	7.05	0.087	6.963			0.087			
0.50	7.20	0.090	7.110			0.090			
0.45	7.25	0.093	7.157			0.093			
0.40	7.25	0.095	7.155			0.095			
0.35	7.25	0.097	7.153			0.097			
0.30	7.25	0.100	7.150			0.100			
0.28	7.26	0.101	7.159			0.101			
0.26	7.26	0.102	7.158			0.102			
0.24	7.28	0.103	7.177			0.103			
0.22	7.27	0.106	7.164			0.106			
0.20	7.26	0.109	7.151			0.109			
0.18	7.25	0.112	7.138			0.112			
0.16	7.24	0.118	7.122			0.118			
0.14	7.23	0.124	7.106			0.124			
0.12	7.22	0.131	7.089			0.131			
0.10	7.20	0.142	7.058			0.142			
0.09	7.15	0.152	6.998			0.152			
0.08	7.10	0.162	6.938			0.162			
0.07	7.05	0.171	6.879			0.171			
0.06	7.00	0.190	6.810			0.190			
0.05	6.95	0.214	6.736			0.214			
0.04	6.90	0.247	6.653			0.247			
0.03	6.85	0.314	6.536			0.314			
0.025	6.80	0.361	6.439			0.361			
0.020	6.75	0.447	6.303			0.447			
0.015	6.75	0.589	6.161			0.589			
0.010	6.70	0.808	5.892			0.808			
0.009	6.70	0.855	5.845			0.855			
0.008	6.65	0.922	5.728			0.922			
0.007	6.60	0.979	5.621			0.979			
0.006	6.55	1.045	5.505			1.045			
0.005	6.50	1.14	5.36			1.14			
0.004	6.45	1.23	5.22			1.23			
0.003	6.40	1.33	5.07			1.33			
0.002	6.35	1.52	4.83			1.52			
0.001	6.25	2.14	4.11			2.14			
0.0009	6.20	2.28	3.92			2.28			
0.0008	6.45	2.47	3.98			2.47			
0.0007	7.00	2.76	4.24			2.76			
0.0006	8.00	3.04	4.96			3.04			
0.0005	9.90	3.42	6.48			3.42			

Table 12

CROSS SECTIONS FOR Cd^{111*}

E (MeV)	Total	Non-Elastic	Elastic	In-Elastic	Absorption	n, γ	n, p	n, α	n, 2n
15.0	4.55	1.960	2.590	0.281	0.0394	0.0024	0.0324	0.0046	1.640
14.5	4.60	1.965	2.635	0.290	0.0349	0.0025	0.0283	0.0041	1.640
14.0	4.62	1.970	2.650	0.317	0.0305	0.0026	0.0243	0.0036	1.623
13.5	4.60	1.975	2.625	0.362	0.0268	0.0027	0.0210	0.0031	1.586
13.0	4.58	1.980	2.600	0.450	0.0236	0.0029	0.0180	0.0027	1.506
12.5	4.56	1.985	2.575	0.575	0.0202	0.0031	0.0149	0.0022	1.390
12.0	4.54	1.990	2.550	0.737	0.0173	0.0032	0.0122	0.0019	1.236
11.5	4.52	1.995	2.525	0.944	0.0149	0.0034	0.0100	0.0015	1.036
11.0	4.47	2.000	2.470	1.194	0.0129	0.0037	0.0080	0.0012	0.793
10.5	4.41	2.005	2.405	1.474	0.0112	0.0039	0.0064	0.0009	0.520
10.0	4.36	2.010	2.350	1.768	0.0100	0.0041	0.0051	0.0008	0.232
9.5	4.32	2.020	2.300	1.989	0.0091	0.0045	0.0040	0.0006	0.022
9.0	4.27	2.030	2.240	2.022	0.0082	0.0048	0.0029	0.0005	0.0
8.5	4.22	2.040	2.180	2.032	0.0076	0.0051	0.0021	0.0004	
8.0	4.18	2.050	2.130	2.043	0.0072	0.0056	0.0013	0.0003	
7.5	4.11	2.060	2.050	2.053	0.0070	0.0060	0.0008	0.0002	
7.0	4.08	2.080	2.020	2.073	0.0071	0.0065	0.0005	0.0001	
6.5	4.03	2.090	1.940	2.083	0.0075	0.0072	0.0003	0.0	
6.0	4.01	2.109	1.901	2.101	0.0080	0.0078	0.0002		
5.5	4.00	2.130	1.870	2.121	0.0087	0.0086	0.0001		
5.0	4.00	2.130	1.870	2.120	0.0096	0.0096	0.0		
4.5	4.02	2.120	1.900	2.109	0.0108	0.0108			
4.0	4.08	2.081	1.999	2.069	0.0125	0.0125			
3.5	4.22	2.043	2.177	2.028	0.0150	0.0150			
3.0	4.48	1.976	2.504	1.958	0.0180	0.0180			
2.8	4.63	1.957	2.673	1.938	0.0190	0.0190			
2.6	4.77	1.909	2.861	1.887	0.0220	0.0220			
2.4	5.00	1.861	3.139	1.838	0.0230	0.0230			
2.2	5.30	1.803	3.497	1.777	0.0260	0.0260			
2.0	5.35	1.746	3.604	1.716	0.0300	0.0300			
1.8	5.55	1.660	3.890	1.626	0.0340	0.0340			
1.6	5.78	1.564	4.216	1.525	0.0390	0.0390			
1.4	6.02	1.519	4.501	1.473	0.0460	0.0460			
1.2	6.25	1.627	4.623	1.572	0.0550	0.0550			
1.0	6.50	1.736	4.764	1.670	0.0660	0.0660			
0.95	6.55	1.762	4.788	1.692	0.0700	0.0700			
0.90	6.60	1.771	4.829	1.698	0.0730	0.0730			
0.85	6.65	1.798	4.852	1.719	=n, γ	0.079			
0.80	6.70	1.804	4.896	1.721		0.083			
0.75	6.75	1.763	4.987	1.676		0.087			

*Cross sections are given in barns

Table 12 (Contd)

E (MeV)	Total	Non-Elastic	Elastic	In-Elastic	Absorption	n, γ	n, p	n, α	n, 2n
0.70	6.80	1.621	5.179	1.530	=n, γ	0.091	0.0	0.0	0.0
0.65	6.85	1.409	5.441	1.313		0.096			
0.60	6.95	1.156	5.794	1.056		0.100			
0.55	7.05	1.024	6.026	0.920		0.104			
0.50	7.20	0.808	6.392	0.700		0.108			
0.45	7.25	0.640	6.610	0.528		0.112			
0.40	7.25	0.510	6.740	0.396		0.114			
0.35	7.25	0.304	6.946	0.188		0.116			
0.30	7.25	0.120	7.130	0.0		0.120			
0.28	7.26	0.121	7.139			0.121			
0.26	7.27	0.122	7.148			0.122			
0.24	7.28	0.123	7.157			0.123			
0.22	7.27	0.128	7.142			0.128			
0.20	7.26	0.131	7.129			0.131			
0.18	7.25	0.135	7.115			0.135			
0.16	7.24	0.141	7.099			0.141			
0.14	7.23	0.148	7.082			0.148			
0.12	7.22	0.157	7.063			0.157			
0.10	7.20	0.171	7.029			0.171			
0.09	7.15	0.182	6.968			0.182			
0.08	7.10	0.194	6.906			0.194			
0.07	7.05	0.205	6.845			0.205			
0.06	7.00	0.228	6.772			0.228			
0.05	6.95	0.257	6.693			0.257			
0.04	6.90	0.296	6.604			0.296			
0.03	6.85	0.376	6.474			0.376			
0.025	6.80	0.433	6.367			0.433			
0.020	6.75	0.536	6.214			0.536			
0.015	6.75	0.707	6.043			0.707			
0.010	6.70	0.969	5.731			0.969			
0.009	6.70	1.05	5.65			1.05			
0.008	6.65	1.11	5.54			1.11			
0.007	6.60	1.17	5.43			1.17			
0.006	6.55	1.25	5.30			1.25			
0.005	6.50	1.37	5.13			1.37			
0.004	6.45	1.48	4.97			1.48			
0.003	6.40	1.60	4.80			1.60			
0.002	6.35	1.82	4.53			1.82			
0.001	6.25	2.57	3.68			2.57			
0.0009	6.20	2.74	3.46			2.74			
0.0008	6.45	2.96	3.49			2.96			
0.0007	7.00	3.31	3.69			3.31			
0.0006	8.00	3.65	4.35			3.65			
0.0005	9.90	4.11	5.79			4.11			

Table 13

CROSS SECTIONS FOR Cd^{112}*

E (MeV)	Total	Non-Elastic	Elastic	In-Elastic	Absorption	n, γ	n, p	n, α	n, 2n
15.0	4.55	1.960	2.590	0.314	0.0308	0.0020	0.0253	0.0035	1.615
14.5	4.60	1.965	2.635	0.355	0.0267	0.0021	0.0216	0.0030	1.583
14.0	4.62	1.970	2.650	0.405	0.0228	0.0021	0.0182	0.0025	1.542
13.5	4.60	1.975	2.625	0.466	0.0195	0.0022	0.0152	0.0021	1.490
13.0	4.58	1.980	2.600	0.556	0.0164	0.0023	0.0124	0.0017	1.408
12.5	4.56	1.985	2.575	0.681	0.0138	0.0025	0.0100	0.0013	1.290
12.0	4.54	1.990	2.550	0.850	0.0115	0.0026	0.0079	0.0010	1.129
11.5	4.52	1.995	2.525	1.071	0.0097	0.0028	0.0061	0.0008	0.914
11.0	4.47	2.000	2.470	1.356	0.0081	0.0030	0.0045	0.0006	0.636
10.5	4.41	2.005	2.405	1.671	0.0068	0.0032	0.0032	0.0004	0.327
10.0	4.36	2.010	2.350	1.998	0.0059	0.0034	0.0022	0.0003	0.058
9.5	4.32	2.020	2.300	2.015	0.0051	0.0036	0.0013	0.0002	0.0
9.0	4.27	2.030	2.240	2.025	0.0048	0.0039	0.0008	0.0001	
8.5	4.22	2.040	2.180	2.035	0.0047	0.0042	0.0004	0.0001	
8.0	4.18	2.050	2.130	2.045	0.0047	0.0046	0.0001	0.0	
7.5	4.11	2.060	2.050	2.055	0.0049	0.0049	0.0		
7.0	4.08	2.080	2.020	2.075	0.0053	0.0053			
6.5	4.03	2.090	1.940	2.084	0.0059	0.0059			
6.0	4.01	2.109	1.901	2.103	0.0063	0.0063			
5.5	4.00	2.130	1.870	2.123	0.0070	0.0070			
5.0	4.00	2.130	1.870	2.122	0.0078	0.0078			
4.5	4.02	2.120	1.900	2.111	0.0088	0.0088			
4.0	4.08	2.081	1.999	2.071	0.0102	0.0102			
3.5	4.22	2.043	2.177	2.030	0.0121	0.0121			
3.0	4.48	1.976	2.504	1.962	0.0140	0.0140			
2.8	4.63	1.957	2.673	1.941	0.0160	0.0160			
2.6	4.77	1.909	2.861	1.891	0.0180	0.0180			
2.4	5.00	1.861	3.139	1.842	0.0190	0.0190			
2.2	5.30	1.803	3.497	1.782	0.0210	0.0210			
2.0	5.35	1.746	3.604	1.722	0.0240	0.0240			
1.8	5.55	1.660	3.890	1.633	0.027	0.027			
1.6	5.78	1.564	4.216	1.532	0.032	0.032			
1.4	6.02	1.138	4.882	1.101	0.037	0.037			
1.2	6.25	0.985	5.265	0.940	0.045	0.045			
1.0	6.50	0.923	5.577	0.870	0.053	0.053			
0.95	6.55	0.853	5.697	0.796	0.057	0.057			
0.90	6.60	0.774	5.826	0.714	0.060	0.060			
0.85	6.65	0.691	5.959	0.627	=n, γ	0.064			
0.80	6.70	0.601	6.099	0.533		0.068			
0.75	6.75	0.499	6.251	0.428		0.071			

*Cross sections are given in barns

Table 13 (Contd)

E (MeV)	Total	Non-Elastic	Elastic	In-Elastic	Absorption	n, γ	n, p	n, α	n, 2n
0.70	6.80	0.364	6.436	0.290	=n, γ	0.074	0.0	0.0	0.0
0.65	6.85	0.207	6.643	0.129		0.078			
0.60	6.95	0.082	6.868	0.0		0.082			
0.55	7.05	0.085	6.965			0.085			
0.50	7.20	0.088	7.112			0.088			
0.45	7.25	0.091	7.159			0.091			
0.40	7.25	0.093	7.157			0.093			
0.35	7.25	0.095	7.155			0.095			
0.30	7.25	0.098	7.152			0.098			
0.28	7.26	0.099	7.161			0.099			
0.26	7.27	0.100	7.170			0.100			
0.24	7.28	0.101	7.179			0.101			
0.22	7.27	0.104	7.166			0.104			
0.20	7.26	0.107	7.153			0.107			
0.18	7.25	0.110	7.140			0.110			
0.16	7.24	0.115	7.125			0.115			
0.14	7.23	0.121	7.109			0.121			
0.12	7.22	0.128	7.092			0.128			
0.10	7.20	0.140	7.060			0.140			
0.09	7.15	0.149	7.001			0.149			
0.08	7.10	0.158	6.942			0.158			
0.07	7.05	0.167	6.883			0.167			
0.06	7.00	0.186	6.814			0.186			
0.05	6.95	0.209	6.741			0.209			
0.04	6.90	0.242	6.658			0.242			
0.03	6.85	0.307	6.543			0.307			
0.025	6.80	0.353	6.447			0.353			
0.020	6.75	0.437	6.313			0.437			
0.015	6.75	0.577	6.173			0.577			
0.010	6.70	0.791	5.909			0.791			
0.009	6.70	0.837	5.863			0.837			
0.008	6.65	0.902	5.748			0.902			
0.007	6.60	0.958	5.642			0.958			
0.006	6.55	1.02	5.53			1.02			
0.005	6.50	1.12	5.38			1.12			
0.004	6.45	1.21	5.24			1.21			
0.003	6.40	1.30	5.10			1.30			
0.002	6.35	1.49	4.86			1.49			
0.001	6.25	2.09	4.16			2.09			
0.0009	6.20	2.23	3.97			2.23			
0.0008	6.45	2.42	4.03			2.42			
0.0007	7.00	2.70	4.30			2.70			
0.0006	8.00	2.98	5.02			2.98			
0.0005	9.90	3.35	6.55			3.35			

Table 14

CROSS SECTIONS FOR Cd^{113}*

E (MeV)	Total	Non-Elastic	Elastic	In-Elastic	Absorption	n, γ	n, p	n, α	n, 2n
15.0	4.55	1.960	2.590	0.205	0.0231	0.0026	0.0179	0.0026	1.732
14.5	4.60	1.965	2.635	0.208	0.0200	0.0027	0.0152	0.0021	1.737
14.0	4.62	1.970	2.650	0.216	0.0172	0.0028	0.0127	0.0017	1.737
13.5	4.60	1.975	2.625	0.232	0.0149	0.0029	0.0106	0.0014	1.728
13.0	4.58	1.980	2.600	0.265	0.0128	0.0031	0.0087	0.0010	1.702
12.5	4.56	1.985	2.575	0.320	0.0110	0.0033	0.0071	0.0006	1.654
12.0	4.54	1.990	2.550	0.403	0.0095	0.0034	0.0057	0.0004	1.578
11.5	4.52	1.995	2.525	0.515	0.0084	0.0037	0.0045	0.0002	1.472
11.0	4.47	2.000	2.470	0.655	0.0076	0.0039	0.0036	0.0001	1.337
10.5	4.41	2.005	2.405	0.826	0.0071	0.0042	0.0029	0.0	1.172
10.0	4.36	2.010	2.350	1.031	0.0066	0.0044	0.0022		0.972
9.5	4.32	2.020	2.300	1.261	0.0065	0.0048	0.0017		0.753
9.0	4.27	2.030	2.240	1.501	0.0063	0.0051	0.0012		0.523
8.5	4.22	2.040	2.180	1.747	0.0063	0.0055	0.0008		0.287
8.0	4.18	2.050	2.130	2.036	0.0064	0.0060	0.0004		0.072
7.5	4.11	2.060	2.050	2.053	0.0066	0.0065	0.0001		0.0
7.0	4.08	2.080	2.020	2.073	0.0070	0.0070	0.0		
6.5	4.03	2.090	1.940	2.082	0.0077	0.0077			
6.0	4.01	2.109	1.901	2.101	0.0083	0.0083			
5.5	4.00	2.130	1.870	2.121	0.0092	0.0092			
5.0	4.00	2.130	1.870	2.120	0.0102	0.0102			
4.5	4.02	2.120	1.900	2.108	0.0116	0.0116			
4.0	4.08	2.081	1.999	2.068	0.0134	0.0134			
3.5	4.22	2.043	2.177	2.027	0.0159	0.0159			
3.0	4.48	1.976	2.504	1.957	0.0190	0.019			
2.8	4.63	1.957	2.673	1.936	0.021	0.021			
2.6	4.77	1.909	2.861	1.886	0.023	0.023			
2.4	5.00	1.861	3.139	1.836	0.025	0.025			
2.2	5.30	1.803	3.497	1.775	0.028	0.028			
2.0	5.35	1.746	3.604	1.714	0.032	0.032			
1.8	5.55	1.660	3.890	1.624	0.036	0.036			
1.6	5.78	1.564	4.216	1.523	0.041	0.041			
1.4	6.02	1.522	4.498	1.473	0.049	0.049			
1.2	6.25	1.631	4.619	1.572	0.059	0.059			
1.0	6.50	1.740	4.760	1.670	0.070	0.070			
0.95	6.55	1.766	4.784	1.692	0.074	0.074			
0.90	6.60	1.776	4.824	1.698	0.078	0.078			
0.85	6.65	1.803	4.847	1.719	=n, γ	0.084			
0.80	6.70	1.810	4.890	1.721		0.089			
0.75	6.75	1.769	4.981	1.676		0.093			

*Cross sections are given in barns

Table 14 (Contd)

E (MeV)	Total	Non-Elastic	Elastic	In-Elastic	Absorption	n, γ	n, p	n, α	n, 2n
0.70	6.80	1.628	5.172	1.530	=n, γ	0.098	0.0	0.0	0.0
0.65	6.85	1.415	5.435	1.313		0.102			
0.60	6.95	1.163	5.787	1.056		0.107			
0.55	7.05	1.031	6.019	0.920		0.111			
0.50	7.20	0.820	6.380	0.700		0.116			
0.45	7.25	0.648	6.602	0.528		0.120			
0.40	7.25	0.518	6.732	0.396		0.122			
0.35	7.25	0.312	6.938	0.188		0.124			
0.30	7.25	0.128	7.122	0.0		0.128			
0.28	7.26	0.129	7.131			0.129			
0.26	7.27	0.131	7.139			0.131			
0.24	7.28	0.132	7.148			0.132			
0.22	7.27	0.137	7.133			0.137			
0.20	7.26	0.140	7.120			0.140			
0.18	7.25	0.144	7.106			0.144			
0.16	7.24	0.151	7.099			0.151			
0.14	7.23	0.159	7.071			0.159			
0.12	7.22	0.168	7.052			0.168			
0.10	7.20	0.183	7.017			0.183			
0.09	7.15	0.195	6.955			0.195			
0.08	7.10	0.207	6.893			0.207			
0.07	7.05	0.220	6.830			0.220			
0.06	7.00	0.244	6.756			0.244			
0.05	6.95	0.275	6.675			0.275			
0.04	6.90	0.317	6.583			0.317			
0.03	6.85	0.403	6.447			0.403			
0.025	6.80	0.464	6.336			0.464			
0.020	6.75	0.573	6.177			0.573			
0.015	6.75	0.756	5.994			0.756			
0.010	6.70	1.04	5.660			1.04			
0.009	6.70	1.10	5.60			1.10			
0.008	6.65	1.18	5.47			1.18			
0.007	6.60	1.26	5.34			1.26			
0.006	6.55	1.34	5.21			1.34			
0.005	6.50	1.46	5.04			1.46			
0.004	6.45	1.59	4.86			1.59			
0.003	6.40	1.71	4.69			1.71			
0.002	6.35	1.95	4.40			1.95			
0.001	6.25	2.75	3.50			2.75			
0.0009	6.20	2.93	3.27			2.93			
0.0008	6.45	3.17	3.28			3.17			
0.0007	7.00	3.54	3.46			3.54			
0.0006	8.00	3.90	4.10			3.90			
0.0005	9.90	4.39	5.51			4.39			

Table 15

CROSS SECTIONS FOR Cd^{114}*

E (MeV)	Total	Non-Elastic	Elastic	In-Elastic	Absorption	n, γ	n, p	n, α	n, 2n
15.0	4.55	1.960	2.590	0.237	0.0178	0.0020	0.0139	0.0019	1.705
14.5	4.60	1.965	2.635	0.266	0.0145	0.0021	0.0109	0.0015	1.685
14.0	4.62	1.970	2.650	0.308	0.0118	0.0022	0.0084	0.0012	1.650
13.5	4.60	1.975	2.625	0.372	0.0094	0.0023	0.0062	0.0009	1.594
13.0	4.58	1.980	2.600	0.489	0.0074	0.0024	0.0044	0.0006	1.484
12.5	4.56	1.985	2.575	0.616	0.0059	0.0025	0.0030	0.0004	1.367
12.0	4.54	1.990	2.550	0.790	0.0047	0.0026	0.0019	0.0002	1.195
11.5	4.52	1.995	2.525	1.000	0.0040	0.0028	0.0011	0.0001	0.992
11.0	4.47	2.000	2.470	1.238	0.0036	0.0030	0.0006	0.0	0.758
10.5	4.41	2.005	2.405	1.489	0.0034	0.0032	0.0002		0.513
10.0	4.36	2.010	2.350	1.754	0.0035	0.0034	0.0001		0.252
9.5	4.32	2.020	2.300	2.012	0.0037	0.0037	0.0		0.042
9.0	4.27	2.030	2.240	2.026	0.0040	0.0040			0.0
8.5	4.22	2.040	2.180	1.998	0.0042	0.0042			
8.0	4.18	2.050	2.130	2.045	0.0046	0.0046			
7.5	4.11	2.060	2.050	2.055	0.0050	0.0050			
7.0	4.08	2.080	2.020	2.075	0.0054	0.0054			
6.5	4.03	2.090	1.940	2.084	0.0059	0.0059			
6.0	4.01	2.109	1.901	2.103	0.0064	0.0064			
5.5	4.00	2.130	1.870	2.123	0.0071	0.0071			
5.0	4.00	2.130	1.870	2.122	0.0079	0.0079			
4.5	4.02	2.120	1.900	2.111	0.0089	0.0089			
4.0	4.08	2.081	1.999	2.071	0.0103	0.0103			
3.5	4.22	2.043	2.177	2.031	0.0122	0.0122			
3.0	4.48	1.976	2.504	1.961	0.015	0.015			
2.8	4.63	1.957	2.673	1.941	0.016	0.016			
2.6	4.77	1.909	2.861	1.891	0.018	0.018			
2.4	5.00	1.861	3.139	1.842	0.019	0.019			
2.2	5.30	1.803	3.497	1.781	0.022	0.022			
2.0	5.35	1.746	3.604	1.722	0.024	0.024			
1.8	5.55	1.660	3.890	1.632	0.028	0.028			
1.6	5.78	1.564	4.216	1.532	0.032	0.032			
1.4	6.02	1.139	4.881	1.101	0.038	0.038			
1.2	6.25	0.985	5.265	0.940	0.045	0.045			
1.0	6.50	0.924	5.576	0.870	0.054	0.054			
0.95	6.55	0.853	5.697	0.796	0.057	0.057			
0.90	6.60	0.774	5.826	0.714	0.060	0.060			
0.85	6.65	0.692	5.958	0.627	=n, γ	0.065			
0.80	6.70	0.602	6.098	0.533		0.069			
0.75	6.75	0.499	6.251	0.428		0.071			

*Cross sections are given in barns

Table 15 (Contd)

E (MeV)	Total	Non-Elastic	Elastic	In-Elastic	Absorption	n, γ	n, p	n, α	n, 2n
0.70	6.80	0.365	6.435	0.290	=n, γ	0.075	0.0	0.0	0.0
0.65	6.85	0.208	6.642	0.129		0.079			
0.60	6.95	0.083	6.867	0.0		0.083			
0.55	7.05	0.086	6.964			0.086			
0.50	7.20	0.089	7.111			0.089			
0.45	7.25	0.092	7.158			0.092			
0.40	7.25	0.094	7.156			0.094			
0.35	7.25	0.096	7.154			0.096			
0.30	7.25	0.099	7.151			0.099			
0.28	7.26	0.100	7.160			0.100			
0.26	7.27	0.101	7.169			0.101			
0.24	7.28	0.102	7.178			0.102			
0.22	7.27	0.105	7.165			0.105			
0.20	7.26	0.108	7.152			0.108			
0.18	7.25	0.111	7.139			0.111			
0.16	7.24	0.117	7.123			0.117			
0.14	7.23	0.122	7.108			0.122			
0.12	7.22	0.130	7.090			0.130			
0.10	7.20	0.141	7.059			0.141			
0.09	7.15	0.150	7.000			0.150			
0.08	7.10	0.160	6.940			0.160			
0.07	7.05	0.170	6.880			0.170			
0.06	7.00	0.188	6.812			0.188			
0.05	6.95	0.212	6.738			0.212			
0.04	6.90	0.244	6.656			0.244			
0.03	6.85	0.310	6.540			0.310			
0.025	6.80	0.357	6.443			0.357			
0.020	6.75	0.442	6.308			0.442			
0.015	6.75	0.583	6.167			0.583			
0.010	6.70	0.799	5.901			0.799			
0.009	6.70	0.846	5.854			0.846			
0.008	6.65	0.912	5.738			0.912			
0.007	6.60	0.968	5.632			0.968			
0.006	6.55	1.03	5.52			1.03			
0.005	6.50	1.13	5.37			1.13			
0.004	6.45	1.22	5.23			1.22			
0.003	6.40	1.32	5.08			1.32			
0.002	6.35	1.50	4.85			1.50			
0.001	6.25	2.12	4.13			2.12			
0.0009	6.20	2.26	3.94			2.26			
0.0008	6.45	2.44	4.01			2.44			
0.0007	7.00	2.73	4.27			2.73			
0.0006	8.00	3.01	4.99			3.01			
0.0005	9.90	3.38	6.52			3.38			

Table 16

CROSS SECTIONS FOR Cd^{116}*

E (MeV)	Total	Non-Elastic	Elastic	In-Elastic	Absorption	n, γ	n, p	n, α	n, 2n
15.0	4.55	1.960	2.590	0.275	0.0098	0.0020	0.0063	0.0015	1.675
14.5	4.60	1.965	2.635	0.294	0.0075	0.0021	0.0043	0.0011	1.664
14.0	4.62	1.970	2.650	0.317	0.0058	0.0022	0.0028	0.0008	1.647
13.5	4.60	1.975	2.625	0.353	0.0045	0.0023	0.0016	0.0006	1.618
13.0	4.58	1.980	2.600	0.403	0.0035	0.0024	0.0008	0.0003	1.574
12.5	4.56	1.985	2.575	0.470	0.0029	0.0025	0.0002	0.0002	1.512
12.0	4.54	1.990	2.550	0.555	0.0028	0.0026	0.0001	0.0001	1.432
11.5	4.52	1.995	2.525	0.680	0.0028	0.0028	0.0	0.0	1.312
11.0	4.47	2.000	2.470	0.845	0.0030	0.0030			1.152
10.5	4.41	2.005	2.405	1.064	0.0032	0.0032			0.938
10.0	4.36	2.010	2.350	1.354	0.0034	0.0034			0.652
9.5	4.32	2.020	2.300	1.674	0.0037	0.0037			0.342
9.0	4.27	2.030	2.240	1.954	0.0040	0.0040			0.072
8.5	4.22	2.040	2.180	2.036	0.0042	0.0042			0.0
8.0	4.18	2.050	2.130	2.045	0.0046	0.0046			
7.5	4.11	2.060	2.050	2.055	0.0050	0.0050			
7.0	4.08	2.080	2.020	2.075	0.0054	0.0054			
6.5	4.03	2.090	1.940	2.084	0.0059	0.0059			
6.0	4.01	2.109	1.901	2.103	0.0064	0.0064			
5.5	4.00	2.130	1.870	2.123	0.0071	0.0071			
5.0	4.00	2.130	1.870	2.122	0.0079	0.0079			
4.5	4.02	2.120	1.900	2.111	0.0089	0.0089			
4.0	4.08	2.081	1.999	2.071	0.0103	0.0103			
3.5	4.22	2.043	2.177	2.031	0.0122	0.0122			
3.0	4.48	1.976	2.504	1.961	0.015	0.015			
2.8	4.63	1.957	2.673	1.941	0.016	0.016			
2.6	4.77	1.909	2.861	1.891	0.018	0.018			
2.4	5.00	1.861	3.139	1.842	0.019	0.019			
2.2	5.30	1.803	3.497	1.781	0.022	0.022			
2.0	5.35	1.746	3.604	1.722	0.024	0.024			
1.8	5.55	1.660	3.890	1.632	0.028	0.028			
1.6	5.78	1.564	4.216	1.532	0.032	0.032			
1.4	6.02	1.139	4.881	1.101	0.038	0.038			
1.2	6.25	0.985	5.265	0.940	0.045	0.045			
1.0	6.50	0.924	5.576	0.870	0.054	0.054			
0.95	6.55	0.853	5.697	0.796	0.057	0.057			
0.90	6.60	0.774	5.826	0.714	0.060	0.060			
0.85	6.65	0.692	5.958	0.627	=n, γ	0.065			
0.80	6.70	0.602	6.098	0.533		0.069			
0.75	6.75	0.499	6.251	0.428		0.071			

*Cross sections are given in barns

Table 16 (Contd)

E (MeV)	Total	Non-Elastic	Elastic	In-Elastic	Absorption	n, γ	n, p	n, α	n, 2n
0.70	6.80	0.365	6.435	0.290	=n, γ	0.075	0.0	0.0	0.0
0.65	6.85	0.208	6.642	0.129		0.079			
0.60	6.95	0.083	6.867	0.0		0.083			
0.55	7.05	0.086	6.964			0.086			
0.50	7.20	0.089	7.111			0.089			
0.45	7.25	0.092	7.158			0.092			
0.40	7.25	0.094	7.156			0.094			
0.35	7.25	0.096	7.154			0.096			
0.30	7.25	0.099	7.151			0.099			
0.28	7.26	0.100	7.160			0.100			
0.26	7.27	0.101	7.169			0.101			
0.24	7.28	0.102	7.178			0.102			
0.22	7.27	0.105	7.165			0.105			
0.20	7.26	0.108	7.152			0.108			
0.18	7.25	0.111	7.139			0.111			
0.16	7.24	0.117	7.123			0.117			
0.14	7.23	0.122	7.108			0.122			
0.12	7.22	0.130	7.090			0.130			
0.10	7.20	0.141	7.059			0.141			
0.09	7.15	0.150	7.000			0.150			
0.08	7.10	0.160	6.940			0.160			
0.07	7.05	0.170	6.880			0.170			
0.06	7.00	0.188	6.812			0.188			
0.05	6.95	0.212	6.738			0.212			
0.04	6.90	0.244	6.656			0.244			
0.03	6.85	0.310	6.540			0.310			
0.025	6.80	0.357	6.443			0.357			
0.020	6.75	0.442	6.308			0.442			
0.015	6.75	0.583	6.167			0.583			
0.010	6.70	0.799	5.901			0.799			
0.009	6.70	0.846	5.854			0.846			
0.008	6.65	0.912	5.738			0.912			
0.007	6.60	0.968	5.632			0.968			
0.006	6.55	1.03	5.52			1.03			
0.005	6.50	1.13	5.37			1.13			
0.004	6.45	1.22	5.23			1.22			
0.003	6.40	1.32	5.08			1.32			
0.002	6.35	1.50	4.85			1.50			
0.001	6.25	2.12	4.13			2.12			
0.0009	6.20	2.26	3.94			2.26			
0.0008	6.45	2.44	4.01			2.44			
0.0007	7.00	2.73	4.27			2.73			
0.0006	8.00	3.01	4.99			3.01			
0.0005	9.90	3.38	6.52			3.38			

Table 17

NEUTRON CROSS SECTIONS OF CADMIUM FOR THE ENERGY RANGE 0.001 TO 2.38 eV

E (eV)	σ_{Total}	$\sigma_{Elastic}$	$\sigma_{Absorption}$
0.001	9755.6	10.75	9744.8
0.002	6972.5	10.55	6961.9
0.004	5036.6	10.52	5026.1
0.005	4553.2	10.54	4542.7
0.007	3931.6	10.61	3921.0
0.008	3717.5	10.65	3706.8
0.010	3397.7	10.73	3387.0
0.015	2930.9	10.98	2919.9
0.020	2684.8	11.25	2673.5
0.0253	2537.0	11.61	2525.4
0.030	2462.3	11.88	2450.4
0.040	2409.2	12.62	2396.6
0.050	2650.1	13.52	2436.6
0.060	2560.7	14.60	2546.1
0.065	2639.6	15.22	2624.4
0.070	2734.2	15.90	2718.3
0.075	2845.0	16.66	2828.3
0.080	2972.5	17.50	2955.0
0.085	3117.9	18.43	3099.5
0.090	3282.4	19.46	3262.9
0.095	3467.2	20.61	3446.6
0.100	3684.8	21.87	3662.9
0.120	4740.6	28.41	4712.2
0.140	6151.3	37.37	6113.9
0.160	7431.7	46.43	7385.3
0.180	7589.6	49.66	7539.9
0.200	6323.3	44.25	6279.0
0.220	4563.1	34.90	4528.2
0.230	3780.3	30.48	3749.8
0.240	3117.8	26.62	3091.2
0.250	2575.2	23.38	2551.8
0.260	2137.7	20.72	2117.0
0.270	1787.0	18.54	1768.5
0.280	1505.8	16.76	1489.0
0.290	1279.2	15.30	1263.9
0.300	1095.5	14.10	1081.4
0.310	945.4	13.11	932.3
0.320	821.5	12.28	809.2

Table 17 (Contd)

E (eV)	σ_{Total}	$\sigma_{Elastic}$	$\sigma_{Absorption}$
0.330	719.4	11.58	707.8
0.340	633.6	10.99	622.6
0.350	561.4	10.49	550.9
0.360	500.1	10.05	490.0
0.380	402.8	9.35	393.4
0.414	289.9	8.52	281.4
0.420	274.7	8.40	266.3
0.430	251.9	8.23	243.7
0.450	213.7	7.93	205.8
0.460	197.7	7.81	189.9
0.470	183.4	7.69	175.7
0.475	176.7	7.64	169.1
0.480	170.5	7.59	162.9
0.490	158.8	7.50	151.3
0.500	148.3	7.41	140.9
0.532	120.8	7.18	113.6
0.550	108.4	7.08	101.4
0.575	94.25	6.96	87.29
0.590	87.02	6.89	80.13
0.600	82.66	6.85	75.81
0.625	73.10	6.77	66.33
0.650	65.14	6.70	58.44
0.683	56.52	6.62	49.90
0.700	52.75	6.58	46.17
0.750	43.73	6.49	37.24
0.800	36.99	6.43	30.56
0.850	31.81	6.37	25.44
0.876	29.59	6.35	23.24
0.890	28.52	6.34	22.18
0.910	27.09	6.32	20.77
0.930	25.78	6.31	19.47
0.950	24.58	6.30	18.28
0.970	23.49	6.29	17.20
0.980	22.98	6.28	16.70
0.990	22.49	6.28	16.21
1.00	22.01	6.27	15.74
1.025	20.92	6.26	14.66
1.05	19.92	6.25	13.67
1.06	19.45	6.25	13.20
1.07	19.20	6.24	12.96
1.08	18.86	6.24	12.62

Table 17 (Contd)

E (eV)	σ_{Total}	$\sigma_{Elastic}$	$\sigma_{Absorption}$
1.09	18.51	6.23	12.28
1.11	17.84	6.23	11.61
1.125	17.43	6.22	11.21
1.13	17.30	6.22	11.08
1.15	16.75	6.21	10.54
1.20	15.55	6.20	9.35
1.25	14.53	6.19	8.34
1.30	13.66	6.18	7.48
1.35	12.91	6.17	6.74
1.44	11.78	6.15	5.63
1.50	11.18	6.14	5.04
1.60	10.36	6.13	4.23
1.70	9.72	6.12	3.60
1.78	9.30	6.12	3.18
1.86	8.94	6.11	2.83
1.90	8.79	6.11	2.68
2.00	8.44	6.10	2.34
2.10	8.16	6.10	2.06
2.20	7.93	6.10	1.83
2.29	7.73	6.09	1.64
2.33	7.66	6.09	1.57
2.38	7.58	6.09	1.49

Table 18

NEUTRON CROSS SECTION OF CD-113
FOR THE ENERGY RANGE .001 TO 2.38 eV

E (eV)	σ_{Total}	$\sigma_{Elastic}$	$\sigma_{Absorption}$
0.001	79,499.3	44.24	79,455.1
0.002	56,807.7	42.66	56,765.0
0.004	41,023.3	42.42	40,980.9
0.005	37,082.2	42.60	37,039.6
0.007	32,013.7	43.14	31,970.6
0.008	30,268.1	43.46	30,224.7
0.010	27,661.9	44.16	27,617.7
0.015	23,855.2	46.14	23,809.1
0.020	21,848.4	48.36	21,800.0
0.0253	20,643.5	50.96	20,592.6
0.030	20,034.8	53.47	19,981.3
0.040	19,602.6	59.57	19,543.0
0.050	19,937.0	66.87	19,870.2
0.060	20,839.5	75.66	20,763.8
0.065	21,483.5	80.74	21,402.8
0.070	22,255.3	86.33	22,169.0
0.075	23,158.4	92.51	23,065.9
0.080	24,198.9	99.35	24,099.5
0.085	25,384.8	106.9	25,277.9
0.090	26,726.0	115.3	26,610.7
0.095	28,233.5	124.7	28,108.9
0.100	29,918.8	135.0	29,783.8
0.120	38,621.7	188.3	38,433.3
0.140	50,127.8	261.4	49,866.5
0.160	60,571.8	335.3	60,236.5
0.180	61,859.2	361.7	61,497.5
0.200	51,530.2	317.5	51,212.7
0.220	37,174.3	241.3	36,933.0
0.230	30,789.1	205.2	30,583.9
0.240	25,386.0	173.7	25,212.2
0.250	20,959.6	147.3	20,812.3
0.260	17,391.4	125.6	17,265.8
0.270	14,531.2	107.8	14,423.4
0.280	12,237.2	93.31	12,143.8
0.290	10,389.0	81.43	10,307.6

Table 18 (Contd)

E (eV)	σ_{Total}	$\sigma_{Elastic}$	$\sigma_{Absorption}$
0.300	8,890.6	71.65	8,819.0
0.310	7,666.6	63.54	7,603.0
0.320	6,658.8	56.77	6,602.0
0.330	5,822.4	51.08	5,771.3
0.340	5,123.0	46.25	5,076.8
0.350	4,533.8	42.14	4,491.7
0.360	4,034.0	38.60	3,995.4
0.380	3,240.3	32.90	3,207.4
0.414	2.319.4	26.08	2,293.3
0.420	2,196.0	25.14	2,170.8
0.430	2,009.7	23.72	1,986.0
0.450	1,698.3	21.31	1,677.0
0.460	1,567.6	20.28	1,547.3
0.470	1,450.5	19.35	1,431.1
0.475	1,396.5	18.92	1,377.6
0.480	1,345.3	18.51	1,326.8
0.490	1,250.6	17.75	1,232.8
0.500	1,164.9	17.05	1,147.9
0.532	940.3	15.19	925.1
0.550	840.0	14.34	825.7
0.575	724.2	13.34	710.8
0.590	665.3	12.82	652.4
0.600	629.7	12.51	617.2
0.625	551.7	11.81	539.9
0.650	486.7	11.22	475.5
0.683	416.5	10.57	405.9
0.700	385.8	10.28	375.5
0.750	312.2	9.57	302.7
0.800	257.2	9.02	248.2
0.850	215.1	8.59	206.5
0.876	197.0	8.41	188.6
0.890	188.2	8.31	179.9
0.910	176.6	8.19	168.4
0.930	165.9	8.07	157.8
0.950	156.2	7.97	148.2
0.970	147.3	7.87	139.4
0.980	143.1	7.82	135.3
0.990	139.1	7.78	131.3
1.00	135.3	7.74	127.5
1.025	126.3	7.64	118.7
1.05	118.2	7.55	110.6

Table 18 (Contd)

E (eV)	σ_{Total}	$\sigma_{Elastic}$	$\sigma_{Absorption}$
1.06	115.1	7.51	107.6
1.07	112.2	7.48	104.8
1.08	109.4	7.44	102.0
1.09	106.7	7.41	99.30
1.11	101.6	7.35	94.24
1.125	97.99	7.31	90.68
1.13	96.83	7.30	89.54
1.15	92.40	7.24	85.15
1.20	82.55	7.12	75.43
1.25	74.21	7.02	67.19
1.30	67.10	6.94	60.16
1.35	60.98	6.86	54.12
1.44	51.95	6.74	45.21
1.50	47.05	6.67	40.38
1.60	40.39	6.58	33.80
1.70	35.15	6.51	28.64
1.78	31.73	6.46	25.27
1.86	28.85	6.42	22.43
1.90	27.57	6.40	21.18
2.00	24.80	6.36	18.44
2.10	22.50	6.32	16.18
2.20	20.58	6.29	14.29
2.29	19.11	6.27	12.84
2.33	18.52	6.26	12.26
2.38	17.83	6.24	11.59

Table 19

PARTIAL INELASTIC CROSS SECTION
FOR NATURAL CADMIUM

E (MeV)	Total Inelastic (barns)	(Cross sections for average levels) $\bar{0.3}$	$\bar{0.6}$	$\bar{1.2}$	$\bar{1.3}$
1.5	1.423	0.128	0.662	0.283	0.350
1.45	1.289	0.131	0.708	0.220	0.230
1.4	1.194	0.135	0.760	0.173	0.126
1.35	1.125	0.141	0.808	0.124	0.052
1.3	1.106	0.146	0.868	0.092	0.0
1.25	1.102	0.152	0.912	0.038	
1.2	1.098	0.158	0.940	0.0	
1.15	1.103	0.166	0.937		
1.1	1.102	0.176	0.926		
1.05	1.098	0.189	0.908		
1.00	1.070	0.200	0.870		
0.95	1.020	0.224	0.796		
0.90	0.960	0.246	0.714		
0.85	0.900	0.273	0.627		
0.80	0.830	0.297	0.533		
0.75	0.740	0.312	0.428		
0.70	0.600	0.310	0.290		
0.675	0.512	0.303	0.209		
0.65	0.425	0.296	0.129		
0.625	0.332	0.282	0.050		
0.60	0.264	0.264	0.0		
0.575	0.240	0.240			
0.55	0.220	0.220			
0.525	0.192	0.192			
0.50	0.175	0.175			
0.475	0.154	0.154			
0.45	0.132	0.132			
0.425	0.115	0.115			
0.4	0.099	0.099			
0.375	0.070	0.070			
0.35	0.047	0.047			
0.325	0.023	0.023			
0.30	0.0	0.0			

Table 20

PARTIAL INELASTIC CROSS SECTIONS
FOR THE ODD ISOTOPES OF CADMIUM

E (MeV)	Total Inelastic (barns)	(Cross section for average levels) .$\bar{3}$0	.$\bar{6}$0	1.$\bar{2}$0
1.5	1.457	0.512	0.662	0.283
1.45	1.452	0.524	0.708	0.220
1.4	1.473	0.540	0.760	0.173
1.35	1.496	0.564	0.808	0.124
1.3	1.544	0.584	0.868	0.092
1.25	1.558	0.608	0.912	0.038
1.2	1.572	0.632	0.940	0.0
1.15	1.601	0.664	0.937	
1.1	1.630	0.704	0.926	
1.05	1.664	0.756	0.908	
1.0	1.670	0.800	0.870	
0.95	1.692	0.896	0.796	
0.9	1.698	0.984	0.714	
0.85	1.719	1.092	0.627	
0.8	1.721	1.188	0.533	
0.75	1.676	1.248	0.428	
0.7	1.530	1.240	0.290	
0.675	1.421	1.212	0.209	
0.65	1.313	1.184	0.129	
0.625	1.178	1.128	0.050	
0.60	1.056	1.056	0.0	
0.575	0.960	0.960		
0.55	0.920	0.880		
0.525	0.768	0.768		
0.5	0.700	0.700		
0.475	0.616	0.616		
0.45	0.528	0.528		
0.425	0.460	0.460		
0.4	0.396	0.396		
0.375	0.280	0.280		
0.35	0.188	0.188		
0.325	0.092	0.092		
0.30	0.0	0.0		

Table 21

PARTIAL INELASTIC CROSS SECTIONS
FOR THE EVEN ISOTOPES OF CADMIUM

E (MeV)	Total Inelastic (barns)	(Cross section for average levels) $\bar{.60}$	$\bar{1.20}$	$\bar{1.30}$
1.5	1.412	0.662	0.283	0.467
1.45	1.235	0.708	0.220	0.307
1.4	1.101	0.760	0.173	0.168
1.35	1.001	0.808	0.124	0.069
1.3	0.960	0.868	0.092	0.0
1.25	0.950	0.912	0.038	
1.2	0.940	0.940	0.0	
1.15	0.937	0.937		
1.1	0.926	0.926		
1.05	0.908	0.908		
1.0	0.870	0.870		
0.95	0.796	0.796		
0.9	0.714	0.714		
0.85	0.627	0.627		
0.8	0.533	0.533		
0.75	0.428	0.428		
0.7	0.290	0.290		
0.675	0.209	0.209		
0.65	0.129	0.129		
0.625	0.050	0.050		
0.60	0.0	0.0		

Table 22

LEGENDRE COEFFICIENTS FOR CADMIUM

E (MeV)	f_1	f_2	f_3	f_4	f_5	f_6	f_7	f_8	f_9	f_{10}	f_{11}	f_{12}
15.0	0.883	0.782	0.676	0.565	0.454	0.358	0.265	0.183	0.1580	0.0523	0.0125	0.0051
14.5	0.875	0.772	0.661	0.550	0.442	0.348	0.256	0.173	0.0970	0.0465	0.0108	0.0042
14.0	0.866	0.753	0.639	0.533	0.432	0.339	0.247	0.164	0.0885	0.0412	0.0092	0.0036
13.5	0.860	0.736	0.620	0.513	0.420	0.330	0.237	0.153	0.0805	0.0360	0.0081	0.0031
13.0	0.849	0.723	0.606	0.495	0.408	0.320	0.228	0.140	0.0720	0.0308	0.0067	0.0028
12.5	0.838	0.705	0.580	0.469	0.394	0.310	0.217	0.127	0.0635	0.0267	0.0057	0.0024
12.0	0.826	0.675	0.560	0.450	0.381	0.299	0.206	0.115	0.0542	0.0212	0.0047	0.0021
11.5	0.810	0.646	0.537	0.430	0.370	0.289	0.195	0.104	0.0475	0.0177	0.0038	0.0019
11.0	0.794	0.622	0.507	0.413	0.357	0.278	0.184	0.092	0.0405	0.0136	0.0029	0.0016
10.5	0.777	0.598	0.485	0.396	0.344	0.267	0.173	0.081	0.0335	0.0102	0.0025	0.0014
10.0	0.757	0.572	0.453	0.376	0.330	0.255	0.161	0.070	0.0263	0.0066	0.0022	0.9912
9.5	0.735	0.548	0.431	0.357	0.314	0.243	0.148	0.059	0.0210	0.0052	0.0020	0.0010
9.0	0.717	0.524	0.408	0.340	0.299	0.231	0.135	0.049	0.0174	0.0041	0.0017	0.0008
8.5	0.700	0.498	0.387	0.323	0.283	0.217	0.123	0.038	0.0144	0.0032	0.0015	0.0006
8.0	0.679	0.473	0.366	0.307	0.267	0.203	0.110	0.030	0.0122	0.0026	0.0013	0.0004
7.5	0.661	0.462	0.350	0.291	0.250	0.189	0.096	0.0245	0.0102	0.0021	0.0011	0.0003
7.0	0.647	0.453	0.336	0.275	0.231	0.174	0.082	0.0205	0.0086	0.0017	0.0009	0.0002
6.5	0.633	0.443	0.327	0.259	0.213	0.159	0.068	0.0175	0.0072	0.0013	0.0008	0.0001
6.0	0.620	0.434	0.318	0.245	0.197	0.143	0.057	0.0155	0.0057	0.0011	0.0006	0.00005
5.5	0.610	0.428	0.313	0.230	0.177	0.125	0.046	0.0125	0.0045	0.0008	0.0005	0.0
5.0	0.606	0.424	0.305	0.215	0.158	0.107	0.037	0.0105	0.0033	0.0006	0.0003	
4.5	0.603	0.420	0.297	0.198	0.138	0.027	0.029	0.0085	0.0026	0.0003	0.0002	
4.0	0.602	0.416	0.287	0.179	0.117	0.068	0.021	0.0060	0.0017	0.0002	0.0001	
3.5	0.600	0.409	0.275	0.160	0.095	0.046	0.016	0.0045	0.0009	0.0001	0.0	
3.0	0.598	0.398	0.257	0.137	0.074	0.031	0.010	0.0025	0.0003	0.0		
2.8	0.596	0.393	0.248	0.128	0.066	0.026	0.009	0.0018	0.0001			
2.6	0.593	0.387	0.237	0.118	0.058	0.021	0.007	0.0012	0.0			
2.4	0.591	0.381	0.224	0.108	0.049	0.017	0.005	0.0008				
2.2	0.587	0.372	0.208	0.097	0.042	0.014	0.004	0.0002				
2.0	0.581	0.361	0.188	0.085	0.034	0.011	0.003	0.0				

Table 22 (Contd)

E (MeV)	f_1	f_2	f_3	f_4	f_5	f_6	f_7	f_8	f_9	f_{10}	f_{11}	f_{12}
1.8	0.571	0.347	0.167	0.073	0.027	0.008	0.002	0.000	0.000	0.0000	0.0000	0.0000
1.6	0.556	0.330	0.138	0.060	0.021	0.005	0.001					
1.4	0.528	0.304	0.112	0.047	0.015	0.003	0.0					
1.2	0.492	0.272	0.080	0.037	0.010	0.002						
1.0	0.458	0.236	0.048	0.022	0.007	0.001						
9.5	0.450	0.225	0.043	0.019	0.006	0.0						
0.9	0.443	0.216	0.040	0.017	0.005							
0.85	0.434	0.205	0.037	0.015	0.004							
0.80	0.427	0.194	0.034	0.014	0.003							
0.75	0.420	0.186	0.032	0.012	0.002							
0.7	0.412	0.176	0.029	0.010	0.001							
0.65	0.402	0.168	0.026	0.009	0.0005							
0.6	0.393	0.158	0.024	0.008	0.0							
0.55	0.382	0.153	0.022	0.006								
0.5	0.370	0.145	0.020	0.005								
0.45	0.357	0.137	0.018	0.004								
0.4	0.341	0.128	0.016	0.003								
0.35	0.322	0.121	0.014	0.002								
0.3	0.297	0.111	0.012	0.001								
0.28	0.283	0.103	0.010	0.0								
0.26	0.267	0.096	0.008									
0.24	0.249	0.084	0.006									
0.22	0.228	0.072	0.004									
0.20	0.204	0.058	0.002									
0.18	0.177	0.043	0.001									
0.16	0.145	0.030	0.0									
0.14	0.111	0.017										
0.12	0.068	0.006										
0.10	0.006	0.0										
0.09	0.0											

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